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CARDIAC PAIN.[1]

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A COMPLAINT of pain in the chest, especially in the left side of the chest, is interpreted by the patient most frequently as arising in the heart, and while disease of the heart and/or of its coronary circulation gives rise to some of the most serious and distressing forms of cardiac pain, pain in this region may not have its origin in the heart or the aorta.

In investigating a complaint of cardiac pain a detailed history and a complete physical examination are necessary, usually with the aids of the electrocardiograph, X rays and the clinical laboratory.

Many obvious pathological conditions of the heart and of the beginning of the aorta, such as aortitis, aortic regurgitation, aneurysm, mitral stenosis, pericarditis, and so on, give rise to pain in the region of the heart; but it is not my intention to deal with these conditions. I wish, however, to devote some attention to conditions in which physical signs of gross disease are less obvious and in which a correct interpretation of the patient's complaint may not at first be apparent. Before concentrating on the cardiac aspect of the complaint it must be remembered that certain abdominal lesions may give rise to pain in the chest as well, for example, perforation of a peptic ulcer, an attack of acute gastritis, gall-stone colic, cholecystitis and acute pancreatitis, and that the causation of a pain interpreted by the patient as occurring in the abdomen may be in the chest, for example coronary thrombosis.

At times, too, the complaint may be traced down to an arthritis of the costo-chondral articulation,

[1] Read at a meeting of the South Australian Branch of the British Medical Association on March 25, 1937.

when evidence of local tenderness is forthcoming and there is an absence of all the cardinal features of pain associated with the heart. Pain occurring in the shoulder and referred down the arm may have its origin in a cervical arthritis. Inflammatory lesions in the lungs and pleura and the occurrence of acute pneumothorax or pulmonary embolism will not be overlooked.

Cardiac pain is but a symptom, and we must not rest content until we have made an attempt with all the means at our disposal to discover the pathological basis, if any, for its occurrence.

CORONARY ARTERY DISEASE AS A BASIS FOR CARDIAC PAIN.

Coronary artery disease is responsible for two of the main painful syndromes of the heart, namely, *angina pectoris* and coronary occlusion. Much experimental work, both on animals and human beings, has supported the hypothesis that anginal pain is due to an absolute or relative ischæmia of the heart muscle, and that it is comparable with the pain occurring in the muscles of a leg in intermittent claudication or when the blood supply of a working muscle is curtailed by a tourniquet. The pain probably arises from a specific physico-chemical or chemical reaction in heart muscle, consequent upon defective blood supply, and acting as a stimulus to the sympathetic nerves. This conception of the causation of the pain seems now to be definitely established, and it certainly explains most of the phenomena associated with anginal pain that have not been explained in any other way.

The relative anoxæmia of the heart muscle would explain the rapid relief given to patients suffering from severe anæmia—hyperchromic (pernicious) or hypochromic (secondary)—when the hæmoglobin value is raised to a normal figure; in other words, when the increased oxygen-carrying power of the blood has enabled the patient to undertake exertion without pain, although previously pain having all the characteristics of angina had occurred on exertion of the same magnitude. Hence before regarding anginal pain as caused by coronary artery disease in such a patient, we must be sure that the hæmoglobin value of his blood is approximately normal.

Atheromatous disease involving the length of the coronary vessel occurs as a part of atheroma involving the vessels of the body generally, but the coronary arteries may be affected most severely, and unfortunately neither the vessels in the *fundus oculi* nor the more superficial arteries can give us an index of the amount of disease in the coronary arteries.

The coronary vessels may be obstructed at their mouths by atheroma of the aorta or by the fibrosis of a syphilitic aortitis, or sudden occlusion may occur from an embolus or from the vegetation from a valve. The most frequent cause of sudden occlusion, however, is thrombosis occurring in a diseased artery.

Cardiac Pain in Coronary Thrombosis.

The pain usually comes on while the patient is at rest, in contradistinction to anginal pain, and not infrequently during sleep. Pain is severe, continuous and unfluctuating, that is, it does not come on with sudden and periodic stabs; it may be slight at the start, dull and aching, and work up to become severe and agonizing. It usually starts over the sternum, in its middle or lower segment; it may be referred down one or both arms, more frequently the left; it may spread to the neck, face, back or abdomen. The pain may begin in the upper part of the abdomen and the lower part of the sternum. The patient is restless, often rolling about in agony. Movement does not seem to increase the pain, as in angina of effort; however, the patient is sometimes immobile. The pain is persistent and does not pass off quickly, as in angina of effort; it may take many hours or even days to subside, not disappearing, as would be expected, until the nerve endings in the infarct are dead. The pain fails to respond to nitrites.

The patient sweats profusely, is collapsed, pale and anxious; the cyanosis and pallor together give the face a light blue-grey colour, considered by some to be pathognomonic. Nausea and vomiting may occur. The blood pressure is low, the drop being very noticeable in patients who previously had a high blood pressure. The pulse is small and running; and the rate may not be greatly altered, but usually is somewhat increased.

Breathlessness and signs of cardiac failure occur, although the physical signs are usually far less pronounced than one would expect from the aspect of the patient. Alterations of rhythm, auricular fibrillation, paroxysmal tachycardia, extrasystoles with gallop rhythm and indistinct heart sounds may be found.

Signs of pulmonary œdema and Cheyne Stokes respiration are not infrequently present.

The patient overtaken in this way is usually a man between the ages of fifty and sixty; it rarely occurs in patients under forty years of age. Occasionally the accident occurs in a woman. The subjects usually have arterial disease and frequently high blood pressure. Patients with auricular fibrillation and rheumatic heart disease are rarely affected. A certain proportion of the patients have had angina previously, but not infrequently some are affected while apparently in robust health. A family predisposition is not infrequent.

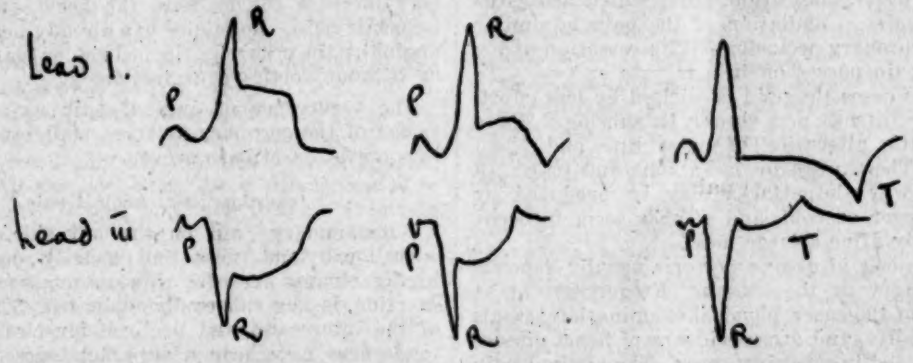
Changes in the Electrocardiogram.

Many electrocardiographic changes may occur, such as bundle branch block; deflections of low voltage may replace those previously well formed; widening, slurring and notching of the *QRS* complex may be shown. However, these changes are not pathognomonic, and in about 10% of cases no changes may be apparent.

The occurrence of the plateau type of curve, especially in Leads I and III, is the most characteristic of coronary thrombosis. In the course of

days or weeks a change takes place and inversion of *T* is noted in one or more leads. The deviation of the *R-T* phase takes place either above or below the iso-electric level and is followed later by a sharply pointed, well-developed *T* wave opposite to that occurring previously. The down stroke of the *T* wave is bowed and is called the *T* wave of Pardee.

Two types are differentiated: (i) The curve which shows finally a negative *T* in Lead I, T_1 inversion associated with an upright T_3. This change is associated with infarction at the apex and in the front of the left ventricle, probably due to thrombosis of the descending branch of the left coronary artery. (ii) The curve which shows finally a negative *T* in Lead III, T_3 inversion associated with an upright T_1. This change occurs with an infarct at the back of the left ventricle. However, sometimes localization cannot be as definite as this, while similar deviations of the *R-T* phase may be seen in acute rheumatism, pericarditis, pericardial effusion, uræmia and pneumonia. The progressive development of the abnormal *T* wave is not seen.



Other changes are described with which, however, we need not concern ourselves here; they need expert interpretation. In chest Lead IV it is possible to explore the silent areas of the heart, and evidence of infarction may be obtained which is absent from the other leads.

Delayed Signs.

Delayed signs are as follow: the occurrence of a temperature, pericarditis, leucocytosis; an increased sedimentation rate of the red blood cells will also help to confirm the diagnosis in the course of the next few days. The occurrence of embolic accidents from the clot formed on the infarct will help in the diagnosis.

Pericarditis occurs in about one-third of the patients and usually develops within two or three days, and is of importance in clinching a diagnosis otherwise equivocal.

Diagnosis.

How may this pain be confused? In acute abdominal conditions, with the exception of acute pancreatitis, the patient is rarely as cyanosed as is the patient with coronary thrombosis; the pain is more abdominal, while in coronary thrombosis it is sternal. Evidence of pulmonary œdema and early congestive failure will direct attention to the cardiac origin, as also will breathlessness associated with the pain.

In the absence of an electrocardiogram a low blood pressure, and especially a large fall in blood pressure when previously it had been known to be high, is one of the most helpful physical signs, although rarely the blood pressure may be raised in coronary thrombosis. Sometimes the diagnosis cannot be certain until the delayed signs have become manifest. With the sudden occurrence of symptoms of cardiac failure in an afebrile patient not doing hard work, even with only slight pain, coronary thrombosis must be considered.

Treatment.

Sufficient morphine should be given to give relief from the severe pain—a quarter to half a grain is administered as often as is required. Inhalation anæsthesia can be used when morphine fails to give relief. Absolute mental and physical rest must be obtained. Shock is treated by heat. Only liquid diet is permitted at first. Complete rest is ordered for at least two months and the patient is nursed as a case of severe cardiac failure. He must be spared all voluntary movement and must make no effort. From the symptoms and pain no gauge of the extent of the thrombosis can be made, so all patients must be given adequate rest.

Continuous oxygen inhalation, preferably in a 50% concentration, given by means of a tent, helps in the relief of the dyspnœa, cyanosis and pain; it is continued for several days and then gradually reduced over at least twenty-four hours, the patient being watched for evidence of recurrence of dyspnœa and cyanosis.

The use of digitalis is not necessary and is probably undesirable unless auricular fibrillation and gross cardiac failure supervene. There is a risk of ventricular tachycardia and heart block in giving large doses of digitalis.

Some recent experimental work on animals suggests that by giving coronary dilating drugs, such as the purine group, the size of the infarct may be reduced; so patients have been given euphylline

et cetera in an attempt to improve the collateral circulation and to reduce the ultimate size of the infarct. In this condition, over which we have so little control, I feel that oxygen and coronary dilatory drugs of the above series are worth an extended trial.

The Pain of Angina Pectoris.

It appears that the pain of *angina pectoris* is similar to that of coronary occlusion, but that it is less intense and does not last so long. Patients who have experienced both, maintain that they are similar but vary in degree. Most often the first complaint is of discomfort or pain on exertion which had previously been accompanied by no discomfort. Situation of the pain is in the upper part of the sternum, but it may be more diffuse over the precordium or generally over the front of the chest. It is either gripping, a pressure or a burning sensation, and is continuous, but there may be waves of increased intensity. Pain, if high in the chest or at the root of the neck, often gives a sensation of strangling or of suffocation, from which arose the name of angina. Radiation of the pain is similar to that of coronary occlusion. With cessation of the effort the pain passes off in a minute or two. In more severe cases the pain is elicited by less effort, being more intense and slower to subside. There may be little alteration of pulse rate and blood pressure. The expression is anxious and pale. In a similar way the attacks may be produced by emotion, anger or cold, and attacks seem to occur more readily after a large meal.

The diagnosis of *angina pectoris* usually depends on the history of the attack. Frequently, in at least 25% of the cases, physical examination reveals no abnormality, and gross evidence of heart disease is not obtained in most instances. The anginal pain does not throb or stab—it is continuous. Usually the same effort brings on the attack on each occasion; and if effort causes an attack one day, on the next occasion the attack is not produced during rest, unless some other cause, such as a full stomach, is also present.

The commonest type of severe angina in bed-ridden patients is that which occurs in young and middle-aged subjects suffering from aortic regurgitation, whether rheumatic or syphilitic. Attacks occur at any time, although often on taking food or on waking. This type is associated with a rise in blood pressure and general vaso-constriction, involving the coronary arteries as well. The pain is relieved by nitrites. This is a grave form of anginal pain. It is important to realize that a full meal may reduce the exercise tolerance of angina patients by 25%, the output of the heart being much increased during digestion. The alterations in the electrocardiogram are modifications of the *R-T* phase and of the *T* wave, rather like the alterations on coronary occlusion. They may be brought out by exercise, and experimental anoxæmia produced in cases of angina similar deviations of the *S-T* phase, at times with anginal pain. In normal persons anoxæmia may cause somewhat similar changes, but without cardiac pain. Changes in between the attacks may simply point to some abnormal state in the myocardium. A normal curve does not exclude angina.

An injection of adrenaline, at one time used to precipitate an attack of *angina pectoris* for diagnostic purposes, is not a justifiable procedure, on account of the liability of coronary thrombosis in a diseased artery or the precipitation of ventricular fibrillation. Similar attacks occur in patients with paroxysmal hyperpiesia, presumably associated with adrenal tumour. The subjects of anginal pain are predominatingly men past middle life, often with high blood pressure and evidence of myocardial degeneration; they may be younger men with syphilis.

Anginal Pain at Rest.

While effort is the most common precipitating cause, anginal pain does occur at rest, when emotion, by raising the blood pressure and the heart rate, may increase the load on the heart and produce ischæmic pain. Reference has already been made to anginal pain occurring in bed-ridden patients with or without aortic regurgitation.

The occurrence of anginal pain as a result of spasm of the coronary arteries, while an attractive hypothesis, is still unproven.

Investigation of Anginal Pain.

Submammary pain on the left side, associated with local tenderness and usually occurring in highly strung neurotic women, unassociated with exertion, is as a rule easily evaluated. The fibrositis of the intercostal and pectoral muscles with local tenderness may bear a superficial resemblance to anginal pain, for exertion and increased breathing aggravate the pain, which may even be referred down the left arm. Local treatment by heat and massage readily removes the pain. Perhaps the condition which most frequently gives rise to difficulty is gastric pain coming on after food. It is unassociated with the typical radiation. Anginal pain produced by ingestion of food usually needs the additional factors of exertion or cold to produce it. The effect of exertion alone should be studied.

While some patients cease to have angina after coronary thrombosis, this accident is sometimes the start of anginal pain which comes on with effort.

Treatment.

The diagnosis of *angina pectoris* being established, should the patient be told the name of his ailment? I think not, provided he is willing to cooperate and to do as is required of him. My own plan is to explain to the patient in general terms what the discomfort and pain in the chest mean, that is, to enable him to appreciate the significance of the symptoms as being due to a diminished circulatory reserve, so that he will restrict his mode of life to avoid all the factors which by experience

he has found produce his painful seizures. If the attacks are becoming more frequent or if they occur on the slightest exertion, a period of rest in bed is indicated; but in an ordinary case it is best for the patient to continue his activities short of producing an attack, excluding prolonged exertion, physical strain, exposure to sudden alterations in temperature or emotional stress.

Diet.—Relief of digestive symptoms is important, and the diet should consist of plain, easily digested food. The patient should eat slowly, should avoid large meals and should rest for half to one hour after meals.

Smoking.—Smoking must be moderated, and in most cases it is best to advise complete abstinence.

Reduction of Obesity.—Treatment of syphilis and a reduction of hypertension may be attempted. In the plethoric an occasional venesection may be helpful.

Drugs.—From the time of Herberden's first description of the condition in 1768 to the present day many different lines of treatment have been advocated. Fothergill in 1776 advised the treatment of flatulence by producing eructations. Reid in 1817 recommended inhalations of oxygen. In 1854 Stokes recommended draughts of chloroform.

A new era originated when Lauder Brunton discovered the effectiveness of the inhalation of amyl nitrite. Murrell in 1879 suggested nitroglycerine, which is still the best drug given prophylactically for aborting an attack or in an attack. Trinitrin tablet (one one-hundredth of a grain) chewed up before being swallowed is usually effective. Amyl nitrite can be reserved for the more severe attacks and for a quicker response.

Purine drugs were first introduced in 1895. Askanazy suggested theobromine sodium salicylate. These drugs have reputations as coronary dilators as well as for their eliminating effects by way of the kidney. Various combinations may be used, as "Diuretin" (ten to fifteen grains), "Theocalcine" (ten to fifteen grains), "Theophylline" (five grains), "Euphyllin" (one and a half grains) and "Theominal" (five grains). They may do some good, and one feels that some patients have been helped.

For restlessness, sleeplessness and excitability a short course of a sedative, such as bromide or phenobarbital, is often most helpful.

Surgical Treatment.

Sympathectomy.—Frank in 1899 suggested the operation of sympathectomy for the relief of the pain, but it was not until 1916 that Jonnesco advocated its use in France. This consists in a mere cutting of the left sympathetic trunk to a complete removal of the superior, middle and stellate ganglia on both sides.

Results have been somewhat uncertain and the operation has not been adopted very extensively, although it is a justifiable procedure in intractable cases of angina. However, one must realize that any operation of this type, by blocking the nerve impulses, removes from the heart the warning call of anoxæmia; and if the operation only permits the patient to do more physical exertion, it is not justifiable. However, in severe cases, when the patient is almost bed-ridden on account of the slightest exertion causing pain, it will be justifiable.

Alcoholic Injections.—Alcoholic injections of the upper five or six dorsal nerve roots were advocated by Mandl in Austria in 1925. It is a method of which I have no personal experience. The operation aims at the destruction of the sympathetic nerve connexions by paravertebral injections of 85% alcohol. The operation is difficult and somewhat uncertain in its effects, but some have had excellent results. It is not so radical a procedure as sympathectomy.

J. C. White reported from the Massachusetts General Hospital, Boston, that 36 patients were treated; 67% were totally relieved of the symptoms on the side injected, and an additional 17% had only mild attacks following the injection. There had been no failure after satisfactory injection, and only one death. It is claimed that a warning signal of over-exertion is not removed by this procedure, since breathlessness and palpitation persist, and besides, mild attacks occur on the uninjected side.

Thyreoidectomy.—While complete removal of the thyreoid gland was at first tried in cases of congestive heart failure for patients who were bed-ridden and in whom all other remedial measures had failed, it has been found that as an operation for the relief of pain in *angina pectoris* it probably has a greater sphere of usefulness. It was my good fortune to be working in Boston when Blumgaart and Levine were publishing their early results, and I also took the opportunity of seeing some of their patients. Some of the results were striking. The explanation of the improvement was not at first apparent and there was much discussion as to the reason for the disappearance of the pain. It has now been shown that the absence of the typical pain soon after the operation is due to the cutting of afferent nerves in the removal of the thyreoid gland—the pain returns with regeneration of these nerves, to disappear again later. It has been shown that relief from pain is satisfactory only if the basal metabolic rate is reduced to −20% to −30% and then kept at −15% to −20% by giving thyreoid extract. The explanation would appear to be the lowering of the metabolic rate, so that the tissue requirements as regards oxygen are met by the lowered circulation; for as the pain of *angina pectoris* is due to an ischæmia of cardiac muscle, a lowering of the metabolic rate may compensate for the inadequacy of the coronary circulation by decreasing the range of the tissue requirements to a level commensurate with the impaired blood supply. The lowered metabolism in general would also decrease the amount of work which the heart has to perform.

To quote Blumgaart's figures: Thirty-one patients with *angina pectoris* were treated by total thyreoidectomy. Twelve recovered sufficiently to be able to return to work. Seven of these remained free from

attacks for from three to eighteen months. Five patients were relieved for from three to nine months before attacks returned. The patients had relief of pain, but activity was restricted on account of myocardial insufficiency. Eleven patients remained; five of them were better following the operation; three died.

Similar results have been obtained by Levine and Eppinger. In twenty-three cases the results were excellent in eight, good in six, moderately good in four, fairly good in one. There were four fatal cases; two followed operation and two occurred from coronary thrombosis at a later date.

It is too early to assess the value of the procedure, but in the treatment of a patient to whom ordinary lines of treatment fail to give relief, total thyreoidectomy must be considered. It is well to state, however, that the operation is considered by those who have performed it to be much more difficult than the subtotal thyreoidectomy for thyreotoxicosis. It is essential that the patient should have a fairly healthy myocardium in order to survive the operation, and also that he should have expectation of at least some months of post-operative health.

Establishment of a Collateral Circulation.—Attempts to improve the vascular supply to the heart have been made by Beck and his colleagues at Cleveland, United States of America. Working with dogs, they have attempted to obtain collateral circulation by way of the parietal pericardium to the heart muscle. There are three main sources of blood supply to the heart: (i) coronary arteries, (ii) Thebesian vessels, (iii) extracardiac anastomoses between the coronary system and other branches of the aorta in the fatty tissues at the base of the heart. Beck and his colleagues tried to obtain a collateral vascular bed for the heart, utilizing for the purpose parietal pericardium, pericardial fat and the mediastinal tissues. They found that almost total occlusion of both coronary arteries was compatible with life if a collateral vascular bed had previously been prepared. The stimulus to bring about continuity between the two circulations, cardiac and extracardiac, was a decreased pressure in the coronary circulation, which they secured by the use of periosteal bands or silver clips.

Finally human beings were operated upon. The first case was that of a man, aged forty-eight years, who had a two years' history of *angina pectoris*. A pedicle graft of the left *pectoralis major*, including the internal mammary artery, was sutured to the inner surface of the parietal pericardium. This and the epicardium were roughened with a burr and the inner edge of the *pectoralis major* was attached to the outer surface of the parietal pericardium. The patient was entirely free from pain and able to do light work three and a half months after the operation; three months later he was in regular employment as a gardener and regarded himself as cured. Beck has done eleven of these operations with five deaths; five of six survivors have had definite benefit.

From this will be seen the lines along which medical thought is moving to palliate anginal pain. The future alone will show us what is justifiable and will indicate the relief that we may expect from operative procedures.

Tachycardia and Anginal Pain.

Patients suffering from prolonged attacks of paroxysmal tachycardia not infrequently have anginal pain. Often in the mild attacks substernal tension is experienced. Here we must consider that the heart is overburdened by the excessive rate of beating.

Tobacco as a Cause of Angina.

Substernal tension and a sense of constriction are at times felt by heavy smokers on exertion, and relief of the symptoms is experienced when tobacco is discarded. In elderly men tobacco may be provocative when there is a predisposition to angina. It has been supposed that heavy smoking can lead to arteriosclerosis and can also cause spasm of coronary arteries; neither of these suppositions has been proved. Anginal pains may occur in hyperthyreoidism, and relief has been obtained after thyreoidectomy; but here it may be the increased rate of the heart acting on a predisposition to angina consequent on underlying disease of the coronary arteries.

Cardiac Pain in Functional Heart Disease.

Patients with effort syndrome, "D.A.H." or neuro-circulatory asthenia, frequently complain of pain over the heart or of a feeling of substernal tension. While this may be associated with exertion, it also occurs independently while the patient is at rest; it also occurs with emotion; if it does occur with exertion, it does not prevent the patient from proceeding on his way. The pain is rarely as agonizing as true angina, and as a rule no evidence of organic heart disease is found. The pain may be described as an ache or stab; it is not continuous, and resting does not give relief, as in angina. There may be some symptoms of shortness of breath, but on questioning the patient we find that this is more an inability to take a deep breath than a true dyspnœa. Heart consciousness and palpitation are nearly always present, and there is a complaint of exhaustion. It is important to make sure by a complete investigation that the condition is functional. Sighing respiration and precordial tenderness are important confirmatory signs. Predisposing causes seem to be infection, operation or other illness, prolonged fatiguing work or heavy strain, mental and physical.

Prognosis for life is good, but for permanent relief the outlook is not good. It needs firm psychological treatment and the definite assurance that no heart disease exists. Treatment is therefore by suggestion, by mild sedatives and by graduated exercise. We must be sure that there is no underlying infection, such as pulmonary tuberculosis or thyreotoxicosis. The greatest stumbling block is the finding of a heart murmur, but it should be regarded after thorough consideration as other

incidental systolic murmurs found in the course of a routine physical examination.

It is important to stress to the patient that his precordial pain and other symptoms are not imaginary.

CARDIAC PAIN IN SO-CALLED PSEUDO-ANGINA.

The term pseudo-angina should be discarded—either a patient has or has not angina. Here pain is paroxysmal; it may be stabbing; more often it is precordial and does not occur especially with exertion; it often occurs at night. There is more frequently a feeling of distension. The patient is greatly distressed and restless, and may be rushing about, and the attack may last for an hour or more; he may be calling out that death is imminent. The chest is often thumped. Physical examination usually reveals no cardio-vascular disease, although it must be remembered that this emotional condition may occur in patients with cardio-vascular disease. It may not be so difficult to arrive at a true interpretation of the pain in an emotional woman, but in a middle-aged man the condition can be extremely difficult to evaluate, especially when the patient is seen for the first time in an attack. The pulse rate may be raised, but the blood pressure is normal. A complete investigation and a deferring of the final diagnosis until a second attack is a wise procedure.

In one man, in whom the final diagnosis was cardiac necrosis, if an attack occurred while he was driving his motor-car he was always able to reach an hotel or his home before giving in. A patient with angina or coronary thrombosis could not do this. Often after the attack a large quantity of urine is voided. Emotional excitement is a frequent precipitating cause.

Treatment.

The main factor is the assurance that no heart disease exists and that recovery will ensue. *Sal volatile* is beneficial and may be carried by the patient to be used in an attack, and even morphine may have to be given to obtain relief. To label such a patient as suffering from *angina pectoris* and to give a bad prognosis is the worst possible treatment, but it is only by a thorough study of the case that the true significance of the symptoms can be appreciated.

WOUNDS AND INCISIONS.[1]

By R. D. WRIGHT, M.S.,
Senior Lecturer in Pathology, University of Melbourne.

WOUNDS first come under consideration either before they are made or after they are made. In the former circumstance they may be called deliberate, even purposive; in the latter case they usually have arisen accidentally. When wounding is contemplated, all the factors which concern its usefulness, factors of healing and after-result, must be weighed in the assessment of what physical agent is to be used, the placement to be employed, and how the disposition of the wounded surfaces may aid to the utmost the healing of the defect produced. When the wound has been produced already, usually no surgical purpose has been served. The considerations here are those of cleaning and aiding of repair processes. Then the same factors play their rôles as in the case of the deliberate wounds. In the latter there has been the chance of correction of the factors influencing wound healing before the incision has been made; in the former, any abnormal factors must be corrected immediately. It is on such clinical investigation that the issue in many cases will depend.

The Arrangement and Placement of Incisions.

Planned wounds must give adequate access to the part concerned or adequate opening up of the tissues to be drained. The mid-line lower abdominal incision for gynæcological work illustrates very well the former principle, the shark-mouth incision for felon the latter. Further requisites, however, are that the wound shall cause a minimum of damage to anatomical structures and have on it also a minimum of stress during the initial healing period. The muscle-splitting incision for appendicectomy is a good example of these principles; the paramedian incision in the upper part of the abdomen is a bad incision in this respect. It divides the aponeurosis of the belly muscles transversely to the direction of its fibres, in both its parts. All straining, turning and coughing, movements involving the transverse group of abdominal muscles, tend to tear away the fibres from the sutures. The fact that the sutures will often tear out of the aponeurosis while the abdomen is being closed further points to the anatomical profanation which has been done. That the incision produces such a small number of ventral herniæ speaks more for the skill of the anæsthetist, the ingenuity of the surgeon, and the standard of his suture material, than for the consideration he has shown for the structures present. It is usually argued that a transverse incision on the upper part of the abdomen is a bad incision because it divides the *rectus abdominis* transversely. It must be realized that above the line joining the lower borders of the ribs this muscle shows little longitudinal contraction compared with the lower abdominal part. I have measured in twelve healthy adult males the proportion of contraction to the original length between these two points when the trunk is fully flexed. The results are shown in Table I.

TABLE I.
Comparison of the Contraction of the Rectus Abdominis Muscle above the Level of the Lower Ribs with the Part below this Level.

	Average Length, Symphysis to Xiphisternum.	Average Interchondral Length.	Subcostal Length.
Relaxed	14·2"	7·15"	7·05"
Contracted	7·4"	5·10"	2·30"
Shortening	48%	29%	67%

[1] Read at a meeting of the Northern Division of the Tasmanian Branch of the British Medical Association on December 1, 1936.

I have divided the muscle into interchondral and subcostal parts because the two pillars of the costal cartilage, spreading out from the xiphisternum, form the sides of an angle from one side to the other of which is stretched the membrane of the abdominal muscles. Because of the attachment of the tendinous inscriptions, any longitudinal contraction of this part of the abdomen can occur only in association with relaxation of this abdominal diaphragm. That it is in fact closely associated with the diaphragm may be observed in any subject, for example, a gymnast, when during heavy lifting or maintained lifts the lower part of the abdomen is maintained contracted; the upper portion postures and billows (up to two inches increase in circumference) with the respiratory movements of the subject, whose chest is maintained relatively rigid by the fixed static position of the arms. For these reasons I believe that it is of less moment to divide transversely the *rectus abdominis* muscle than is a vertical incision of the whole of the aponeurosis of the belly wall.

But, apart from these anatomical and physiological features, one must consider the first requisite mentioned, namely, accessibility. When a paramedian incision is made and the *rectus abdominis* retracted laterally over the most prominent anterior projection of the costal margin, the depth at which the structures are from the surface is increased. When the transverse incision is employed, the upper leaf of the abdomen is not retracted over any prominence; the lower leaf falls backward and downward so that the depth of the structures is, if at all altered, less than before the incision was made. The failure of gut content to herniate from the open wound, even though considerable abdominal contraction may take place, suggests that the mechanics of the abdomen have not been altered; a similar inference may be drawn from the failure of retraction of the *rectus abdominis* within its sheath. The extreme ease with which the incision may be sewn up, with complete absence of tearing and free movement of the lower part of the thorax on the following day, prove conclusively that the wound is under very little tearing stress.

That such an incision does not allow extension downwards to allow the removal of the *appendix vermiformis* if the caecum is fixed is a good thing. In cases of interval appendicitis, if the caecum is fixed, it is far better that the organ be seen and removed through a McBurney incision. If the diagnosis has been mistaken and an acute appendicitis is present in fact, whereas the incision is upper abdominal, again the McBurney incision should be made. It is indefensible that an acutely inflamed appendix should be removed from its bed via an elongated upper paramedian incision; the liberation of the caecum cannot be done under vision, and the new anatomical arrangement, with its apparent advantages of vascularity and localizing adhesions, invariably must be disturbed. Finally, it must be realized that it is the complete sewing of the peritoneum with the exclusion of omentum or any intra-abdominal contents,[1][2] not the flap of muscle over the peritoneal incision, which is responsible for the absence of herniæ.

Perhaps the greatest appeal of the paramedian incision is that it reproduces that dashing stroke so beloved by the sports master—straight up and down, with a good follow-through. A transverse incision savours always of carefulness; there is no glitter about it.

Though very few would think of using a longitudinal incision for thyreoidectomy, it is not uncommon to see this disposition employed in the excision of glands of the neck.

In operations on the testis for hydrocele the usual incision is longitudinal. If the scrotum in these cases is examined carefully, especially by transmitted light, the major blood vessels can be seen running transversely. A well-placed transverse incision will often reduce the number of bleeding points to one or two.

A further requisite of a planned wound is that it will allow the disposition of the healing parts in the most advantageous position for healing and that when the primary healing has taken place the scar should be so placed that it does not interfere with movement of the part. The flaps which are the residue of excision of the breast, if apposed as they lie, will often give a scar which is subjected to strain by movements of the arm. Usually it is possible by further cutting of these to arrange a complete skin flap to cover the whole base of the axilla and allow complete freedom of the arm, with stress falling on full thickness skin and not on scar tissue.

Not only the muscular stresses during the healing stage of a wound affect the result that will be obtained. The factor of contraction of a wound is of importance. Burrows[3] has shown that if the skin edges are not apposed the greater part of the defect may be closed by the contraction together of the edges. This is of great importance in those areas in which the skin is free to move on the deep structures. It is due partly to the œdema of the part, an impending event which must be anticipated when suturing a wound, but also to other factors which have not been so elucidated. If the granulation tissue is bound down to a bony surface this contraction cannot take place. Most frequently this complication is met after operation on the tibia, especially for osteomyelitis. Here the most obvious thing to do is to cut straight down onto the subcutaneous surface. If an incision is made posterior to the medial border of the bone and the bone is entered at this crest, not only is one skin flap left free to contract on the other, but by rotating the leg a free dependent drainage of the whole cavity of the bone is obtained (Figure I). Though much has been written to suggest that drainage of bones subject to osteomyelitis is unnecessary, if it is employed, dependent drainage is far preferable.

The Suture of Wounds.

So far the factors influencing placement and arrangement of incisions have been mentioned. The materials with which apposition of the edges is

secured deserve notice. It has been proved by Howe[4] that in tissue which is not the site of inflammation, catgut corresponds in time of absorption to the period stated by the manufacturer. Inflammatory processes diminish this time very much. In intestinal suturing he, with others,[5] has also shown that chromicized gut gives a suture line of greater strength in the initial stages of healing than does plain catgut. During the process of absorption of catgut a considerable purulent and granulation tissue reaction occurs. For these reasons it will be found that a non-absorbable suture gives a less irritating and cleaner wound in such cavities as the mouth than does catgut.

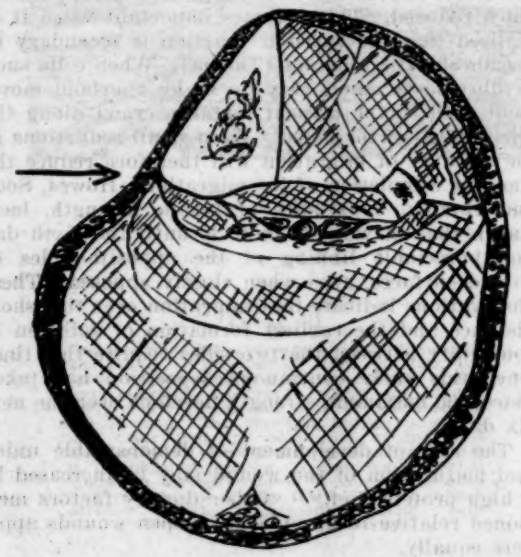


FIGURE 1.

Diagram of a cross-section of the leg, indicating the site suggested for the placement of an incision onto the tibia when drainage is required. The anterior flap becomes bound to the bone; the posterior flap is free to contract up to the edge of the bone. The medullary cavity is entered at its most dependent point.

Not only does the suture material influence the tissues by exciting reaction, but it may be so disposed that the circulation in the important portion of the tissues, that is, in the very edges, is materially altered. Suture material should do no more than lay the edges of a wound together; there should be no appreciable tension on any suture which pierces the skin closer than half an inch from the incision edge; in these circumstances the edges will lie together without any wrinkling of the skin. Though these ideals will not be always possible of attainment, they aim to eliminate all constriction of veins and lymphatics. Constriction of veins is evidenced by a blue swollen edge to the wound; constriction of lymphatics by a hard pink or white edge in an incision of the skin, by a moderately firm swollen edge in a mucous surface, such as that occurring in the stomach. It has been demonstrated that it is practically impossible to suture the mucosa of the intestine without causing lymphatic obstruction and materially increasing the healing time of the incision. It is apparent from these results that apposition without pressure on the mucous membrane is the ideal disposition at which one should aim in the alimentary tract.

The Behaviour of Healing Tissues.

Important though these factors of placement and final disposition of flaps and sutures may be, the actual behaviour of tissues during the healing of a wound merits even more meticulous attention. One may take the reaction of the tissues in the wound uncomplicated by infection or coagulation, such as by diathermy, as a reaction to discontinuity of the normal tissues. In most cases the tissues concerned are epithelial and fibrous tissues. The manner of behaviour of epithelial tissue has been studied mainly by measurement of the growing lip over an area of granulation tissue or by microscopic section. Granulation tissue, especially in minimal quantities, as in healing by first intention, may be studied by estimation of the tensile strength of the wound or by microscopic section. Because of the ubiquity of the granulation tissue (that is, fibro-vascular tissue) reaction, it will be considered before the epithelial reaction.

Granulation.

The anatomical arrangement of the defect arranges the consideration of granulation tissue reaction into two main groups: first, when there is a surface defect and the denuded tissues become subject to all the environmental influences to which the epithelial layer usually is subjected; and secondly, when the defect is within the "rind" of the animal and so the reaction is a response to the abnormal local reactions, with no complicating effects from the adventitious stimuli of the surface.

The typical reaction of an area of vascular fibrous tissue deprived of epithelium is so common that apparently it deserves little notice. If the injury has produced surface necrosis, this dead material becomes mostly absorbed after digestion, partly cast off. If the wound is clean cut, the small monticules of fibrous and vascular response which develop present usually some exudate. Commonly coagulation of this is prevented by the dressing applied. It is a common observation that the wound which is kept moist and naked by dressings presents a much greater amount of granulation tissue than that which has a scab over it.

Carrel[6] has shown that when there was a recently formed wound with surface tissue defect, if the defect was "dressed" with a flap of subcutaneous tissue, the granulation tissue reaction was minimal and in a dog might be scarcely discernible after twenty days. When simple dressings, such as chloramine *T*, were used the reaction was evident in four days and healing by epithelium then progressed. Turpentine, embryo extract or bacteria all excited this "formative action" in the tissues.

When a scab is formed, irritation of the tissues is much less than that produced by chemical dressings. A scab reduces evaporation to a very small amount and is practically impervious to the usual bacteria which contaminate skin surfaces. The tissue reaction excited by chemical substances used as dressing, though useful in exciting the formative reaction in the first few days, may be of the greatest disadvantage if this response is continuously excited by the use of such dressings. The unduly prolonged use of these agents may result in the formation of "proud flesh" (a term much more expressive than "excessive granulation tissue"). Excessive stimulation plays some part here; the relation of such dressings to the epithelium will be discussed under that heading. It appears evident from experimental observations that this fibro-vascular reaction is a prerequisite for epithelial development over this area.

A factor in these reactions is the normality of the development of the intercellular substance of the fibrous tissue. It has been shown by Wolbach and Howes[7] that in the absence of vitamin *C* the intercellular substance of fibrous tissue is not formed. Modern biochemical methods have made estimation of the vitamin *C* content of the tissues of the cadaver possible, and King *et alii*[8] has shown that of the patients dying in one American hospital 20%, on examination, showed a figure on the scorbutic side of normal. Dalldorf[9] has shown by the capillary resistance test that many patients are in a subscorbutic state. The importance of this factor in wound healing suggests that to rely on the chance provision to the patient of food substances rich in this vitamin by visitors is a hazardous attitude on the part of those responsible for hospital dietaries.

That vitamin deficiency is important in cases of pyloric stenosis and prolonged alimentary lesions is evidenced by the work of Simpson.[10]

The features of the vascular reaction which most merit attention are the volume-time relationship and the quality of the blood and pressure at which it is present in the vessels. Over very wide limits the flow of blood may alter, but still adequate granulation tissue be formed; but extreme degrees of arterial blocking or spasm or of heart failure reduce the reaction below the requisite minimum. The same general rule holds with regard to the hæmoglobin concentration in the blood; too often the failure of wound reaction in cases with a low hæmoglobin content is an index of a wider deficiency of the body in accessory food factors. (This term is used in preference to vitamin to indicate a much wider group of substances than the vitamins, for example iron, hæmatinic principle). Anæmia due to blood loss rarely affects the rate of healing. The pressure at which blood is present in capillaries may be altered by change in venous pressure; this most often is changed by alteration of posture. If the valve mechanism of the veins is out of order changes may be great, with corresponding reduction in the rate of flow of blood and increased distension force in the capillaries. At the extremes of capillary pressure exuberance of granulation tissue and excessive exudate may occur; but a force which compresses the surface capillaries does not prevent the growth of epithelium in the area to which the force is applied.

When the tissue defect is within the body the reaction is minimal. If the apposition sutures are sufficiently widely placed, the œdema which develops in the enclosed tissue has the effect of bringing the wound edges closely together; this is seen especially when a piece of skin has a well-developed *panniculus adiposus*. In the suture of hollow viscera a similar reaction takes place. As a consequence the distance over which reaction is to take place is much reduced. This becomes important when it is realized that the vascular reaction is secondary to the fibroblastic reaction (Thoma). When cells such as fibroblasts move, they do so by amœboid movement, and in the present instance crawl along the fibrin fibres of the defect. Even small reductions in the distance of migration will therefore reduce the time for completion of the migration. Howes, Sooy and Harvey, by studies of tensile strength, have shown that in wounds there is until the sixth day no appreciable linking of the opposite sides of wound surfaces, even when closely apposed. These observations indicate that migration over this short distance and the earliest formation of collagen in continuity between the two sides require this time. Once this early continuous deposition has taken place, the maximum strength develops over the next six days.

The rate of development of demonstrable union and maturation of the wound may be increased by a high protein diet.[11] Other dietary factors mentioned relative to fibroplasia in open wounds apply here equally.

Epithelial Development.

Epithelial development over denuded areas presents features not commonly recognized. Most text-books state that the epithelial cells in the fringe which is seen as a faint blue line at the edge of the granulation tissue arrive there by a stepping movement of the cells; each step is believed to be a division of the cell at the edge. Only occasionally do text-books take notice of those observations of Leo Loeb[12] which have been confirmed many times since his original publication in 1898. He described the development of a peculiar jelly-like material under scabs, which is a necessary antecedent to epithelial migration. This material, it should be noted, is more adherent to the coagulum over it than to the granulation tissue under it, and so will be removed with this material on the dressing to which the coagulum is attached. Into this field the epithelium slithers along the under-surface of the solid material. These epithelial cells are not the product of multiplication, nor are they propelled by division of pre-existing cells. In the initial period of healing these cells at the growing edge represent mature cells

ILLUSTRATIONS TO THE ARTICLE BY DR. R. D. WRIGHT.

FIGURE II.

Section of a wound of the skin of a guinea-pig dressed for two days with cotton wool. The mature cornifying skin is seen to the left; to the right an artificial separation of the epithelium from the granulation tissue which has flattened out and matured in association with the epithelium may be seen. The epithelial cells, which are flattened in their crawling movement, show an intimate association with the fibres of the dressing (seen in cross-section as clear round or oval bodies) and the coagulum between these.

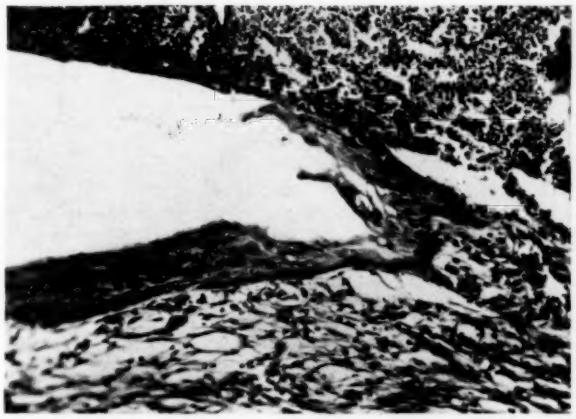


FIGURE III.

Section from the same wound as in Figure II. Epithelium is growing in from the left, but instead of growing over the granulation tissue, has migrated backwards along the under-surface of the coagulum between the fibres of the dressing. This specimen proves more than any other that the peculiarity of the solid surface of the dressing impregnated with fibrin is an important factor in directing epithelial migration across an open wound. Note also, with reference to Figure IV, the smooth under-surface of the separated dressing, with occasional squames in section.

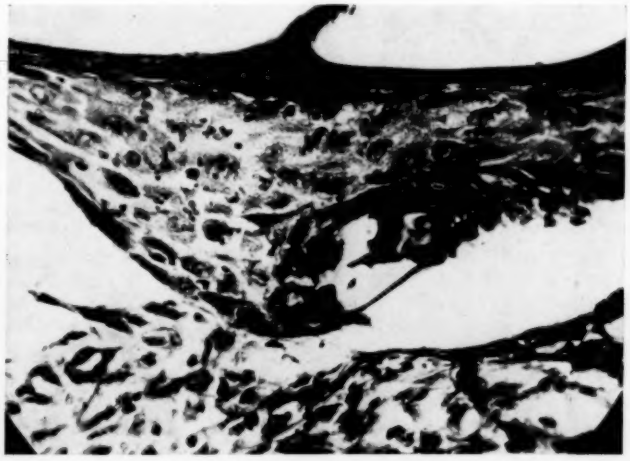


FIGURE IV.

Section of a wound similar to that in Figure II. Epithelium is streaming to the left. It shows that the epithelium has migrated over a fibre of the dressing instead of under it. When the previous dressing was removed two days before, a small amount of hæmorrhage took place. Red blood cells may be seen between the cells and in some places included in vacuoles within the cells, where granules of hæmosiderin have been formed. Here, as in the other sections, mitosis is rare. The section also shows keratinization of the surface cells; some of these have desquamated on the under-surface of the dressing, leaving a smooth upper surface to the epithelium. Probably some tension on the included fibre led to separation of the epithelium to the right from the granulation tissue.

from the original edge which have become mobilized, and now, like amœbæ, crawl along the surface. Like the fibroblasts, they can obtain purchase on wettable surfaces only. Commonly in this stage of migration they show intimate adherence to a coagulum over the surface of the area. Such amœboid movement depends largely on the ability of the cells to stick to the dressing or scab. In sections of wounds in which gauze and cotton wool dressings are sectioned in continuity with the tissues, it is apparent that this growing edge crawls along the under-surface of the gauze rather than the upper surface of the granulation tissue, and is removed with the dressing (Figures II and III).

The next stage after migration of the cells is the development of a more intimate relationship to the granulation tissue as a columnar epithelium in line over the surface. Thickening of this epithelium to a stratified epithelium then takes place by division of the cells, and the fibro-vascular tissue differentiates into a form with more mature fibres and vessels than existed in the granulation stage. Once this maturation and stratification have taken place, lifting off the dressing will no longer remove the epithelium; for there are detached from its surface the effete cornified cells which come away with the dressing, leaving the living epithelium on the connective tissue.

Another feature of this relationship between epithelial and fibrous tissue is the apparent antagonism between the two tissues, that is, if there is heaped-up granulation tissue the epithelium does not grow over it; at the growing edge of the epithelium granulation tissue is depressed and the progress of the epithelium leads to an ironing-out of the granulation tissue. The term "ironing-out", used frequently in the literature, expresses an erroneous biological idea, but also points to the fact that epithelium growing from a well-placed epithelial graft of whatever type is far more useful in reducing excessive granulation tissue than is lunar caustic.

Though Loeb and Spain[13] have shown that wounds 4·0 millimetres in diameter heal more quickly than those 2·0 millimetres in diameter, in many cases the placing of a small epithelial graft one centimetre from the edge of a wound in which the edges have become stationary will excite a renewed activity in this field, with tongues of epithelium growing rapidly from the graft and the edge until they become confluent, while the epithelium of the edge some distance from the graft remains dormant. One can conclude that the growing epithelium liberates a substance which excites migration and proliferation of adjacent epithelium. That such a substance has a limited range on a granulating surface shows the necessity of limiting distances between grafts applied to large surfaces.

Lauber and Sandor[14] have shown that the activity of cod liver oil in promoting epithelial growth corresponds approximately to its vitamin *A* content. Taken in conjunction with its physical properties (forming a non-wettable material) this stimulating property of cod liver oil makes it an invaluable dressing once the fibro-vascular reaction has developed.

Summary.

Reasons are given to support the following contentions:

1. That the transverse upper abdominal incision is, if it provides adequate access, an excellent incision.

2. That a transverse intervascular incision in the scrotum is preferable to a vertical incision.

3. That an incision dorsal to the medial crest of the tibia gives better drainage and more chance of a sound scar in treatment of osteomyelitis of the tibia than an incision over the middle of this surface.

4. That an adequate state of the nutrition of the tissues is desirable before deliberate wounding.

5. That the nutrition of the wounded tissues should not be affected by the pressure of sutures on the blood or lymphatic vasculature of the edges.

6. That in the initial stages the formative reaction of the fibro-vascular tissues in wounds with surface defects should be stimulated by irritant dressings.

7. That when this formative reaction has eventuated, the relationship of the dressing to the invading epithelium should be recognized; that is, if it is a wettable dressing it should be retained as the guide of the epithelium; if the dressing must be removed frequently it should be non-wettable.

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CHRYSOTHERAPY IN RHEUMATOID ARTHRITIS.

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THIS article is not intended to cover all the aspects of the treatment of arthritis, but is a detailed and fairly extensive study of some points of gold therapy in this disease. It is hoped at a later stage to give a more detailed, comprehensive and analytical study of the treatment in the different varieties of this disease, and to lay down certain basic principles in the therapy of arthritis.

Probably gold therapy, in common with other forms of treatment, will receive its maximum share of popularity, followed by waves of criticism and partial revulsion. Not until the swing of the pendulum is within well-ordered confines can its correct place in the therapeutics of rheumatoid arthritis be judged.

The use of gold in medicine dates back at least to the eighth century, when Abu Moussa the Wise recommended it as a cure-all for every known disease. Paracelsus, the alchemist and chemist, in about A.D. 1500, recommended a so-called elixir of life, which was composed of gold and mercury, and gold was first used for tuberculosis in his time. Owing to serious accidents, it was dropped until 1810, when it was revived by Chrestien.[1]

Gold therapy had been in use for tuberculosis and skin diseases before its use was proposed in rheumatoid arthritis by Feldt. Forestier was one of the first to use gold in arthritis. He reasoned that, as gold was active in a chronic infective disease like tuberculosis, it was reasonable to assume it might be of use in another chronic disease in which an important infectious factor appeared to be present.[2] Its use in arthritis was rendered more logical owing to the fact that the French authorities regarded the majority of forms of rheumatoid arthritis as having a tuberculous basis.

Various Forms of Gold Compounds in Use as Therapeutic Agents.

The only active gold salts are those which contain a high proportion of gold, 40% to 60%, combined with a sulphur radicle. Neither colloidal gold nor gold chloride or cyanide is effective.

Some of the compounds used in the treatment of rheumatoid arthritis are the following:

"Myochrysine"—an aurothiomalate of sodium.
"Sanocrysin"—the double thiosulphate of gold and sodium.
"Allochrysin"—aurothio propanol sulphonate of sodium.
"Solganal B"—aurothio glucose.
"Triphal"—sodium aurothiobenzimidazole carboxylic acid.
"Lopion"—auroallylthioureabenzoate of sodium.

Fischer, quoted by Wells,[3] arranges some gold compounds as follows, in the order of decreasing toxicity: "Triphal", "Sanocrysin", "Solganal" and "Lopion". The low toxicity of "Lopion" has been corroborated by other workers.

The Mode of Action of Gold.

The exact mode of action of gold salts has still to be determined, and most experimental work has been done with tuberculosis, not arthritis. Investigations have shown that dilute solutions of gold will inhibit and not destroy the growth of tubercle bacilli in cultures, but that the addition of human or animal serum prevents this.[4]

Davies[5] suggests that gold may act by stimulating some defence forces in the patient, most probably the cells of the reticulo-endothelial system. The function of phagocytosis possessed by this system may be stimulated by the gold, with resultant increased activity, similar apparently to the action caused by milk and other forms of protein shock therapy. Fehlow[6] regards gold treatment as a form of "reiz-therapy". Feldt[7] has shown that if the activity of the reticulo-endothelial system is eliminated by blocking with a suitable substance and by excising the spleen, the action of "Solganal" in animal experiments is greatly diminished.

Möllgaard[8] assumes that in tuberculosis the gold has a direct effect on the bacilli, liberating tuberculin and also toxic substances presumably capable of causing some of the complications of gold therapy.

Franklin[9] puts forward an hypothesis, arrived at after he had treated a series of cases of *lupus erythematosus* with "Sanocrysin", that gold acts in a similar manner to "Salvarsan", but that it is less specific; that is to say, that it has an action upon a far greater number of microorganisms. When "Sanocrysin" is injected into the blood stream, the gold-containing ion has the power of combining with some tissue protein to form a substance which has a direct lethal effect upon a variety of microorganisms. Franklin quotes Müller and Gitmul, who successfully treated with gold a patient suffering from late papular syphilis, who gave a strong positive Wassermann reaction, when all known antisyphilitic drugs had been ineffective. A similar action to that of "Salvarsan" would explain some of the complications which occur during gold therapy. Feldt and Ostwald, quoted by Slot,[10] have suggested a catalytic action of gold salts, that is, that they hasten natural curative processes which, unaided, would proceed with great slowness. Feldt further believes that the metallic atom causes autolysis. Under the influence of gold the active products of disintegration and cellular *débris*, among which are antibacterial bodies, are released and dissolve the pathogenic agents.

Probably operative procedures by which the same products of disintegration are formed act in a similar way. It is a well-known fact that arthritis will be temporarily alleviated by any operative procedure, the relief being proportional to the severity of the operation.

Möllgaard's views dominated his work from the start and led on to the use of anti-tuberculous serum with the gold salts in tuberculosis. To quote his own words:[11] "the introduction of any chemical compound which kills tubercle bacilli into a

seriously infected tuberculous animal must produce a very severe intoxication unless something is done to neutralize the liberated toxins". The worst of this hypothesis is that it is opposed to the results of experiments. "Sanocrysin", although it has the power of inhibiting the growth of tubercle bacilli in culture provided it be present in relatively high concentration, is powerless to kill tubercle bacilli *in vitro*. Möllgaard[12] in a later paper fully recognized this fact and expressed himself as follows:

> The difference between the effects *in vitro* and *in vivo*, the latent period, and the importance of the condition of the infected organism, may be due to the fact that the chemotherapeutical compound is transformed into active bodies by chemical reactions in the organism and that the bodies thus formed are the true parasitotrophic substances which cause the death of the parasites.

This hypothesis is hard to reconcile with the fact that the simultaneous injection of "Sanocrysin" and tubercle bacilli leads on to general tuberculosis.

Experiments of Fry, in which "Sanocrysin" was found to be powerless to prevent the growth of tubercle bacilli in blood clots according to Wright's technique, and which Cummins repeated with identical results, show that no bactericidal substances are developed, at least from the cells included in the whole blood, within a period of a week or ten days, the duration of the experiment.

There are no records of any experiments with streptococci, and this experimental work remains to be done.

It is to be noted that Cummins points out that the therapeutic results are usually obtained by small as well as large doses of gold salts, a proof that for the most part the action is indirect.

In tuberculous animals killed shortly after a dose of "Sanocrysin", it is found that the foci are markedly hyperæmic. No work is on record of observations on arthritic joints. Eichelburger and McClusky, quoted by Franklin, have shown that the excretion of "Sanocrysin" in the urine of tuberculous animals is about 10% less than in healthy animals, given the same doses, indicating that there is a tendency to retention of gold salts in tuberculous tissues. Gallinal, using a micro-technique, has been able to show that the gold is located round tuberculous foci and is particularly visible in the tuberculous organs. If this is so, it is conceivable that sufficient gold may accumulate to produce an inhibitory effect upon the multiplication of tubercle bacilli in the affected tissue; but the fact that small doses are as effective as large suggests that if this does occur it is of secondary importance.

Cummins notes one salient point from animal experiments and the treatment of patients, namely, that "Sanocrysin" can act beneficially only in organisms already possessed of a sufficient degree of resistance to tubercle bacilli to enable them on the one hand to tolerate the results of a sharp focal reaction and on the other to exploit these as a means towards the healing of the focus after stimulation. The same may hold good in arthritis.

Feldt has shown that in experimental infection in animals gold salts have no action if injected at the time of the inoculation of the tubercle bacilli. On the contrary, they can control these infections if injected some time after the inoculation.

These experiments suggest that these compounds have no direct bactericidal effect, but that they are able to stimulate the defence reaction once it has started in the infected subjects. This may account for the fact that gold compounds are more effective in subacute and chronic diseases than in acute infections. In arthritis we have noticed how often old-standing cases have responded to chrysotherapy when all other remedies have failed to produce an improvement. Until we are able to obtain experimental material or *post mortem* specimens from arthritic patients treated by gold the question of the deposition of gold in the synovial tissue or joint surfaces cannot be solved.

Although for the present the precise mode of action of gold remains obscure, it is known that the action of gold is not specific and that gold salts are stored in the reticulo-endothelial system.[13]

The Ætiology of Reactions and Discussion of Accidents with Gold Salts.

Many authorities have drawn attention to the close analogy between the reactions occurring with gold salts and those seen during the early days of the use of organic arsenical preparations. Theories as to the ætiology of these reactions are numerous. Forestier[2] quotes Milian and describes a group of incidents caused by gold salts under the name of biotropism, which he describes as the appearance of the symptoms of some disease which was not previously suspected; amongst these symptoms he recognizes gold bronchitis or gold influenza, boils, *herpes zoster* and conjunctivitis. The French authorities add agranulocytosis to this list, but the Germans do not. Other reactions are believed to be due to the toxicity of the gold itself directly on the affected organ.

Freund, quoted by Crosby, attributes the skin conditions observed during gold treatment to a toxic accumulation of products of decomposition due to the curative process. Wigley,[15] by means of a chemical procedure, showed that gold was present in the skin of patients who had a definite reaction; but control experiments carried out with pieces of apparently normal skin from patients with *lupus erythematosus*, who had received a similar amount of "Sanocrysin", failed to reveal the presence of gold by chemical test. On the other hand, Gaul and Stand, by means of clinical spectroscopy, have produced evidence to show that, regardless of the site—arm, leg, abdomen, chest or back—from which a specimen of skin for biopsy was obtained, the quantity of gold in the specimen was directly proportional to the total dosage administered and that there was also a uniform distribution of the gold in the cutis.[16]

Recently there have been some reports in the literature describing a peculiar violaceous tint of the exposed skin of patients living in Alpine regions

who had received treatment with gold compounds. If a solution of gold sodium thiosulphate is exposed to artificial ultra-violet radiation, an identical colour will result. The possibility of some of the reactions being allergic in nature has to be given consideration, as it is well known that certain drugs can act as allergens. Hinault and Möllgaard[14] have suggested a method of differentiating between the so-called biotropic states and the toxic states, especially in regard to the skin conditions. They suggest the intradermal injection of 0·2 cubic millimetre of a gold salt ("Crisalbine"). A positive reaction is said to take place in the majority of toxic cases and no reaction where biotropism is present. A positive reaction might presumably be expected if the condition were allergic.

Lichtenstein and Stillians[17] found that of over 100 patients tested, all of whom had had cutaneous rashes after treatment with gold sodium thiosulphate, all reacted to the patch test with this salt and not when other substances were used. Also some patients who were receiving treatment with the gold sodium salt reacted to the patch tests before the appearance of the dermatitis.

French authorities lay stress on family and clinical histories showing evidence of idiosyncrasy or allergy, and advise against gold salts when there is a history of asthma or urticaria. Houghton found an eosinophilia of over 20% in every patient developing a gold rash; but this has not been our experience. These observations raise the question of the necessity of a blood count in every case of arthritis before gold therapy is commenced, as a high percentage of eosinophile cells is found in some cases; they also raise the question whether gold should be given in such circumstances.

Costs and Bourderon believe that no significance can be drawn from the number of eosinophile cells. Numerous authors, on the other hand, advise caution in cases in which the eosinophilia rises above 8%.

Types of Reaction.

The following types of reaction may occur during gold therapy.

The Skin.

The skin is the commonest site of reaction, whether the treatment is given for tuberculosis, rheumatism or *lupus erythematosus*. Roxburgh and Corsi[18] found toxic reactions in about 6% of their patients under treatment for lupus; they were unimportant, except in three cases, in which either a mild gold dermatitis or extensive exacerbation of the disease was produced. H. W. Barber[19] mentions a patient who developed a lichenoid rash and was alcoholic; he believes that this fact has an important bearing on the liability to toxic reactions, for he thinks that whether these patients develop toxic reactions in the skin or not depends largely on the extent to which the liver can deal with the drug. H. S. Pemberton,[20] during the treatment of patients with arthritis, observed rashes of all kinds, macular and scarlatiniform being most common. He noted that all the rashes had the common features of marked irritation and desquamation and were sometimes accompanied by so much œdema as to render the patient unrecognizable. Sometimes a chilblain-like rash was noted. J. Bell Ferguson[21] noted that after "Solganal B" some patients developed a gold rash which resembled a scarlatinal rash.

With the improvement of the general condition of the patient under gold therapy, a ruddy appearance of the skin frequently occurs; this has been referred to as the "gold" complexion.

In the series of cases of *lupus erythematosus* reported by Franklin[9] cutaneous eruptions were seen in ten after gold therapy, four of transient erythema, one of erythema with pyrexia, one of a papular eruption, three of exfoliative dermatitis, and one of pruritus.

Forestier, in his series of cases of arthritis, noted that skin reactions were most frequent and that with "Solganal B" there might be large or small papules surrounded by areas of erythema, more or less generalized erythema with all other gold salts, and in severe cases (which were rare), *dermatitis exfoliativa*.

Urticaria may occur in sensitive patients after very small doses. Slot[4] notes that gold may produce erythematous, morbilliform and urticarial lesions, and that in severe cases there may be extensive exfoliation, and also that in patients treated with gold for a long time, a staining of the skin in the parts exposed to bright sunlight may occur. Graham-Little[22] reports a case of an extensive eruption resembling *erythema multiforme* after intramuscular injections of "Solganal".

Mucous Membranes.

Stomatitis, which may be ulcerative, is not uncommon, and dysphagia may occur. Many patients complain of a metallic taste in the mouth; this is of interest, as Coquin has shown that gold salts are excreted in the saliva. Anæsthesia of the tongue has been reported;[23] also loss of taste.

Superficial vulvitis and ulceration about the anus have been described, but are rare. Ketron[24] reported a severe case of conjunctivitis with ulceration of the cornea and total loss of sight in a boy, aged ten years, after the second dose of gold and sodium thiosulphate, although he had been given forty milligrammes without immediate reaction. Forestier notes that conjunctivitis may be associated with keratitis.

The Alimentary System.

Diarrhœa is the most common intestinal complication and may be severe, presumably owing to the excretion of the drug into the alimentary canal. This may recur with each dose. In the allergic subject even a small dose of gold may produce severe gastro-intestinal symptoms. Vomiting and hiccup occasionally occur. Jaundice is sometimes seen; and Slot reports a case in a child after "Solganal B", and at the same time notes that the child had been receiving glucose daily when this occurred.

Driver and Weller[25] report a death following the administration of 25 milligrammes and 50 milligrammes of gold and sodium thiosulphate four days apart to a woman with *lupus erythematosus*. A generalized erythema developed, with fever, prostration, hæmorrhages from the vagina, total loss of hearing, and icterus, and they believe that death resulted from acute yellow atrophy of the liver, due to an idiosyncrasy to gold. Hepatitis associated with icterus has been reported by Langmead.[26]

Renal Complications.

Forestier[3] believes that albuminuria and a tendency to renal insufficiency appear only in predisposed patients, and he thinks that, as long as the functional value of the kidneys is satisfactory and no casts are found in the urine, treatment may be continued even when there is a moderate degree of albuminuria. With the small doses used by him in arthritis he has never seen any signs of nephritis. However, as a large percentage of the gold is excreted through the kidneys, it is conceivable that acute nephritis could occur, and this has been reported in a few cases. Scheel, quoted by Driver and Weller,[25] recorded a fatal reaction in a woman, aged twenty-seven years, suffering from pulmonary tuberculosis and treated with "Sanocrysin". She received an injection of 0·5 gramme and three additional doses of 1·0 gramme each. A severe reaction developed, with nausea, vomiting, albuminuria, oliguria, anuria and diarrhœa, followed by death after two days. *Post mortem* examination revealed œdema of the lungs, hyperæmia of the colon, hæmorrhages in the intestine, and severe degeneration and necrosis of the renal tubules. Scheel stated that the changes resembled those seen in mercuric chloride poisoning.

Vallery-Radot[27] and his co-workers have studied the experimental nephritis produced in rabbits by the injection of relatively large amounts of gold, and have shown that excretion takes place mainly through the convoluted tubules and that the glomeruli play little, if any, part in the process. The nephritis produced seems, therefore, to resemble that caused by mercuric chloride.

According to Wells and Long, all gold compounds have more or less toxic effects on the kidneys and intestines, apparently because of excretion by these organs. Fischer found "Sanocrysin" particularly toxic to the kidneys, while "Solganal" injured the kidneys least, but was toxic to the intestines. Henius and Wissing corroborated Fischer's finding of the low toxicity of "Lopion", especially with respect to the kidneys.

Shock.

Shock has been reported as an immediate result of injection and appears to be anaphylactic, as it is usually accompanied by acute pulmonary œdema, nausea and vomiting, laryngeal œdema, asthma or vertigo. Crosby noted general malaise with a little giddiness and headache, passing off in a few hours, in nine of his cases. In two of these the immediate effects occurred after "Allochrysin" and were not noted when "Solganal" was used.

Pyrexia.

Pyrexia up to 38·3° C. (101° F.) or occasionally higher may occur on the day of injection, particularly after the larger doses. It usually occurs four to eight hours after the injection and is easily controlled, if necessary, by aspirin. The "gold influenza" described by the French authors, with its general febrile phenomena lasting a few days, characterizes another type of febrile response. At times the temperature may continue for some days, in which case the onset of a skin reaction or digestive disturbance may be suspected. According to Hinault and Möllgaard, a continued high temperature should suggest the need of an immediate blood count, as it may be the only outward sign of an incipient agranulocytosis. Two of Crosby's patients with rheumatoid arthritis continued to have exacerbations of temperature until they finally declared themselves with an extensive exfoliative dermatitis.

In the early days of the use of "Sanocrysin" in tuberculosis febrile reactions were common and severe.

Adenitis.

One case of painful enlargement of the glands of the neck in a boy being treated for *lupus erythematosus* is reported by Franklin. The patient had previously been suspected of suffering from tuberculosis, although this had never been proved, and it was possible that the enlargement was due to the lighting up of an old focus; but the fact that the glands resolved so rapidly and gave rise to no further trouble is evidence against this.

The Respiratory System.

Forestier notes that bronchial reactions are more frequently associated with treatment by "Solganal B" than with any other gold salt. Crosby had one case in which a bronchitis of an asthmatic type was noticed; he thinks it is possible that a patient who developed bronchopneumonia some weeks after treatment may also have been influenced by the administration of gold.

Cough is one of the recognized toxic symptoms of chrysotherapy, and Hartfall and Garland[28] regard the dry, irritable, harsh cough of laryngeal type, unassociated with sputum, as characteristic of this particular toxic disturbance. They note that it is not accompanied by physical signs or X ray changes in the chest and is without serious significance.

Exacerbation of the Disease.

Exacerbation of the existing disease does not seem to be very common, so far as rheumatic diseases are concerned; but bad results are sometimes seen in tuberculosis and *lupus erythematosus* as well as other skin diseases.

The Central Nervous System.

Steiner and Fischer have shown that gold collects in the central nervous system and in the cerebro-

spinal fluid. Deafness developed in the fatal case described by Driver and Weller.[25] In Rulison's case of *lupus erythematosus*, in which gold was employed, retinitis developed, and in another similar case after six to eight injections an embolus resulted in blindness in one eye.[29] Lebeuf and Möllgaard, using the test described by Coquin, found gold in the cerebro-spinal fluid of patients who had received "Sanocrysin".

The Hæmatopoietic System.

Among the worst of the toxic effects of gold have been those on the bone marrow and circulating blood. The literature contains numerous references to this type of reaction, which has a high mortality rate.

Stuhl[30] concluded that gold was a capillary poison and as such caused hæmorrhage. Four of his pregnant patients miscarried during treatment. French authorities have reported several examples of thrombocytopenic purpura, agranulocytosis and *aleuchia hæmorrhagica* due to the use of gold salts. Damashek[31] reported a case of fatal aplastic anæmia in a female, aged twenty-five years, after treatment with gold and sodium thiosulphate for *lupus erythematosus*.

Hudson[32] reported a case of purpura initiated by a small (0·05 gramme) initial dose of a second course of intravenous "Crisalbine" for pulmonary tuberculosis. Ellman and Laurence,[33] during a long experience of the use of gold salts in pulmonary tuberculosis and a smaller one in rheumatoid arthritis, met only one serious and fatal case. The patient was a female of sixty-one years, who had suffered from rheumatoid arthritis for nineteen years and who developed agranulocytosis with *purpura hæmorrhagica* during gold therapy.

Crosby reports a case of *purpura simplex* after a total dose of 1·9 grammes of "Solganal" had been given to a female patient with severe rheumatoid arthritis. She had, moreover, a pronounced anæmia of the secondary type, a hæmoglobin value of 54%, a colour index of 0·64 and a lymphocytosis with only 35% of neutrophile cells in a total leucocyte count of 7,200, at the beginning of treatment. Crosby also states that in the light of present knowledge he would not have used chrysotherapy in this case. The patient developed an absolute leucopenia, which improved after the cessation of treatment, and with the administration of nuclein, but the neutropenia remained. The rheumatism improved.

Forestier saw two cases of agranulocytosis and two of purpura with a hæmorrhagic tendency in a total number of 500 cases; he noted that agranulocytosis occurred when the use of amidopyrine was not controlled.

Hartfall and Garland[28] report one death from aplastic anæmia in a series of 274 cases. The patient was a middle-aged woman who had been treated with "Crisalbine".

Alderson[34] reports a case of purpura, which he thought was primarily due to the gold causing an increased permeability of the small vessels.

The presence of focal infections and the relation of these to agranulocytosis are still under discussion.[35] Brown,[36] during a discussion on agranulocytosis, says that experimental work has shown that prolonged absorption of toxins in rabbits has little effect, except the toxin of *Streptococcus viridans*, which has caused rapid, fatal, acute granulocytopenia, a fact which was also shown by Westervelt.[37]

There are few, if any, reports on the bacteriology of the blood and urine in the cases of rheumatoid arthritis in which death has occurred as a result of blood dyscrasias. The interesting observation of Griffith and Race[38] on the occurrence of punctate basophilia in gold treatment is being confirmed by us.

Unfortunately in our series of cases many of the patients could not have blood counts done regularly. Now that we recognize the necessity for accurate observation during treatment, this is being undertaken in the new series, as the possibility of the occurrence of these blood dyscrasias during the course of gold treatment for arthritis indicates that frequent full blood counts, including platelet counts and thorough examination of the leucocytes, are advisable if not compulsory.

The question of the presence of achlorhydria, shift of the neutrophile cells, eosinophilia and relative or absolute lymphocytosis and punctate basophilia and their relation to the occurrence of blood dyscrasias, need further investigation under properly controlled conditions. Mild degrees of hæmorrhagic tendencies, such as menorrhagia, bruising and petechiæ, should lead to thorough investigation; they possibly contraindicate further treatment. The question of the advisability of giving a dose of gold salts during or immediately before a menstrual period also comes into the discussion.

General Survey of the Seventy Cases in this Series.

In this series seventy cases are reviewed from different standpoints. The analysis has produced some interesting observations. A number of the pathological examinations are admittedly incomplete, owing to the difficulty of access to the patients, few of whom were in hospital.

The Number of Complications and Variety of Untoward Reactions.

The numbers of untoward reactions were as follows:

Males	2 reactions in 22 cases.
Females	16 reactions in 48 cases.
Total number of reactions	18 in 70 cases.

From these figures it appears that the female is approximately four times as sensitive as the male.

Five of these eighteen reactions took the form of hæmorrhage, the uterus, lung and bowel being affected; there was one of fatal blood dyscrasia (*aleuchia hæmorrhagica*); there were ten instances of skin reaction, including two of exfoliative dermatitis; and there were four cases with affections of the mucous membranes, one combined with a skin reaction.

TABLE I.

Case Number.	Sex.	Age.	Duration of Disease.	Sedimentation Rate.	Result of Gastric Analysis.	Type of Disease.	Gold Injections. ("Myocrisin.")	Result.	Reactions.
I	M.	24	4 weeks.	4	Hyperacidity.	Spondylitis.	8 doses.	Marked improvement.	None.
II	F.	51	15 years.	14	Hypoacidity.	Spondylitis and rheumatoid arthritis.	4 doses.	Marked improvement.	None.
III	F.	61	12 years.	26	Achlorhydria.	Rheumatoid arthritis.	11 doses.	Marked improvement.	None.
IV	M.	43	3 years.	13	Achlorhydria.	Rheumatoid arthritis.	12 doses.	Marked improvement.	None.
V	F.	49	10 years.	5	Achlorhydria.	Rheumatoid arthritis.	8 doses.	Marked improvement.	None.
VI	F.	52	18 months.	18	Hypoacidity.	Rheumatoid arthritis.	12 doses.	Marked improvement, but recurred.	Papular rash, ulcers in buccal mucous membrane.
VII	F.	24	18 months.	37	Achlorhydria.	Rheumatoid arthritis.	2 doses.	Worse.	Severe hæmorrhagic reaction.
VIII	M.	23	9 months.	36	Achlorhydria.	Rheumatoid arthritis.	20 doses.	Apparently cured, then relapsed.	None.
IX	F.	52	18 months.	14	Hypoacidity.	Spondylitis.	10 doses.	No alteration.	None.
X	F.	56	3 years.	14·5	Achlorhydria.	Rheumatoid arthritis.	7 doses (total 0·7 gramme).	Marked improvement.	None.
XI	M.	58	2 years.	25	Achlorhydria.	Rheumatoid arthritis.	9 doses (total 0·45 gramme).	Marked improvement.	Rash, hæmorrhagic petechiæ.
XII	F.	34	5 years.	30	Hypoacidity.	Rheumatoid arthritis.	2 doses 0·05 gramme each.	Gold stopped.	Scarlatiniform rash.
XIII	M.	34	4 years.	58	Hypoacidity.	Spondylitis and rheumatoid arthritis.	10 doses.	Worse.	Sought other advice.
XIV	F.	49	3 years.	36	Hypoacidity.	Rheumatoid arthritis.	12 doses (total 1·2 grammes). Second course the same.	Marked improvement.	Uterine hæmorrhage at end of second course.
XV	M.	36	5 years.	19	Hyperacidity.	Spondylitis.	5 doses (total 0·25 gramme).	Marked improvement.	None.
XVI	M.	27	3 years.	20	Achlorhydria.	Spondylitis.	10 doses.	Much worse.	None.
XVII	M.	27	5 months.	8	Not examined.	Rheumatoid arthritis.	17 doses (total 1·35 grammes).	Cured.	None.
XVIII	F.	74	1 year.	54	Not examined.	Rheumatoid arthritis.	6 doses (total 0·6 gramme).	Improved.	None.
XIX	F.	34	9 years.	10	Not examined.	Rheumatoid arthritis.	12 doses (total 1·35 grammes).	Cured.	None.
XX	F.	26	1 year.	5	Hyperacidity.	Rheumatoid arthritis.	12 doses (total 1·2 grammes).	Apparently cured.	Ulcers on buccal mucous membrane.
XXI	M.	42	15 years.	22	Hypoacidity.	Spondylitis and rheumatoid arthritis.	8 doses.	Worse.	None.
XXII	M.	52	4 years.	6	Normal acidity.	Rheumatoid arthritis.	8 doses (total 0·8 gramme).	No alteration.	None.
XXIII	M.	13	4 years.	64	Not examined.	Rheumatoid arthritis.	6 doses (total 0·3 gramme).	No alteration.	None.
XXIV	F.	31	6 months.	21	Hypoacidity.	Rheumatoid arthritis.	9 doses (total 0·45 gramme).	Cured.	None.
XXV	F.	50	14 years.	—	Achlorhydria.	Rheumatoid arthritis.	8 doses (total 0·8 gramme).	Unchanged.	None.
XXVI	F.	50	15 years.	10	Not examined.	Rheumatoid arthritis.	15 doses (total 0·95 gramme).	Slight improvement.	None.
XXVII	F.	54	12 months.	29	Hypoacidity.	Rheumatoid arthritis.	14 doses (total 1·1 grammes). 6 doses (total 0·4 gramme).	Marked improvement.	None.
XXVIII	F.	32	6 years.	29	Hypoacidity.	Rheumatoid arthritis.	2 doses 0·05 gramme each.	Refuses further gold; cleared up with general treatment.	Severe in joints.
XXIX	F.	60	20 years.	21	Hypoacidity.	Rheumatoid arthritis.	12 doses (total 1·2 grammes). 6 doses 0·05 gramme each.	Marked improvement.	None.
XXX	M.	45	1 year.	11·5	Not examined.	Rheumatoid arthritis.	16 doses (total 1·15 grammes).	Marked improvement.	None.
XXXI	F.	24	2 years.	11	Not examined.	Rheumatoid arthritis.	8 doses (total 0·6 gramme).	Slight improvement.	None.
XXXII	M.	39	12 months.	51	Achlorhydria.	Rheumatoid arthritis.	3 courses (totals 1·5 gramme, 0·75 gramme, 0·5 gramme).	Marked improvement.	None.
XXXIII	F.	46	15 years.	30	Hypoacidity.	Rheumatoid arthritis.	2 courses (totals 1·6 grammes, 1·15 grammes).	Marked improvement after failing to respond to other measures.	Slight hæmoptysis.
XXXIV	F.	53	12 months.	18	Hypoacidity.	Rheumatoid arthritis.	1 course (total 1·25 grammes).	Marked improvement.	None.
XXXV	F.	46	12 years.	30	Achlorhydria.	Rheumatoid arthritis.	1 course (total 0·89 gramme).	Slight improvement.	None.
XXXVI	F.	52	8 years.	20	Achlorhydria.	Rheumatoid arthritis.	2 courses 0·05 gramme every dose (16 doses).	Marked improvement.	None.
XXXVII	F.	35	2 months.	17	Hypoacidity.	Rheumatoid arthritis.	6 injections 0·1 gramme each.	Marked improvement.	None.
XXXVIII	M.	58	2 years.	16	Hypoacidity.	Rheumatoid arthritis.	Total dosage 1·7 grammes.	Marked improvement.	None.
XXXIX	F.	29	18 months.	22	Hypoacidity.	Rheumatoid arthritis.	2 courses (total 0·85 gramme each) (24 doses).	Marked improvement.	None.
XL	F.	44	11 months.	22	Achlorhydria.	Rheumatoid arthritis.	2 courses (totals 1·2 grammes, 0·6 gramme) (24 doses).	Marked improvement.	None.
XLI	M.	34	9 months.	35	Hypoacidity.	Rheumatoid arthritis.	1 course (total 0·9 gramme) (12 doses).	Free for 6 months, then relapsed.	None.
XLII	F.	52	7 months.	35	Hypoacidity.	Rheumatoid arthritis.	5 injections (total 0·3 gramme).	Rheumatism improved.	Bad hæmoptysis.
XLIII	F.	33	4 years.	18	Hypoacidity.	Rheumatoid arthritis and spondylitis.	4 injections (total 0·2 gramme).	Worse, and refuses further treatment.	None.
XLIV	M.	47	3 years.	42	Hypoacidity.	Rheumatoid arthritis.	14 injections (total 0·7 gramme).	Slight improvement, then relapse.	None.
XLV	F.	59	2 years.	16	Hypoacidity.	Rheumatoid arthritis.	2 injections each 0·05 gramme.	Marked improvement, probably due to other treatment.	Exfoliative dermatitis; hair fell out.
XLVI	F.	23	1 year.	14	Normal.	Rheumatoid arthritis.	11 doses each 0·05 gramme.	Marked improvement.	None.
XLVII	F.	50	15 years.	7	Hypoacidity.	Rheumatoid arthritis.	16 doses (total 0·9 gramme).	Marked improvement.	None.
XLVIII	F.	52		49	Normal.	Rheumatoid arthritis.	17 doses each 0·05 gramme.	Marked improvement.	None.
XLIX	F.	51	3 years.	—	Achlorhydria.	Rheumatoid arthritis.	16 doses each 0·05 gramme.	Marked improvement.	Slight rash after 11 doses.
L	F.	60	6 months.	42	Achlorhydria.	Rheumatoid arthritis.	8 doses (total 0·8 gramme).	Slight improvement.	None.
LI	M.	50	5 years.	30	Normal.	Rheumatoid arthritis.	2 courses each 1·2 grammes.	Cured.	None.

A course generally consisted of 12 doses of 0·05 gramme.

TABLE I.—Continued.

Case Number.	Sex.	Age.	Duration of Disease.	Sedimentation Rate.	Result of Gastric Analysis.	Type of Disease.	Gold Injections. ("Myocrisin.")	Result.	Reactions.
XII	F.	42	5 years.	20	Hypoacidity.	Rheumatoid arthritis.	16 doses each 0·05 gramme.	Marked improvement.	Generalised exfoliative dermatitis.
XIII	F.	49	10 months.	30	Hypoacidity.	Rheumatoid arthritis.	21 doses 0·1 gramme. 22 doses 0·1 gramme.	Stopped, due to complication.	Severe urticaria and temperature to 101°.
XIV	F.	59	11 years.	—	Hypoacidity.	Rheumatoid arthritis and some osteoarthritis.	5 doses each 0·05 gramme.	No alteration.	Stomatitis of buccal mucous membrane.
XV	M.	33	3 years.	24	Achlorhydria.	Spondylitis, ankylopoietica.	14 doses (total 0·8 gramme).	No alteration.	None.
XVI	M.	33	3 years.	25	Not done.	Rheumatoid arthritis.	10 doses each 0·05 gramme.	Marked improvement.	None.
XVII	M.	35	10 years.	3	Achlorhydria.	Rheumatoid arthritis.	10 doses (total 0·75 gramme).	Slight improvement.	None.
XVIII	M.	34	2 years.	15	Not examined.	Rheumatoid arthritis.	8 doses (total 0·4 gramme).	Slight improvement.	None.
XIX	M.	57	6 months.	15	Hypoacidity.	Rheumatoid arthritis.	1 course (12 doses, 0·05 gramme). 18 injections 0·05 gramme each.	Marked improvement.	None.
XX	M.	57	3 years.	13	Achlorhydria.	Rheumatoid arthritis.	3 doses 0·1 gramme.	Marked improvement.	None.
XXI	F.	32	5 years.	40	Achlorhydria.	Rheumatoid arthritis.	10 doses 0·05 gramme.	Died.	Alveolis hæmorrhagica.
XXII	F.	49		41	Hypoacidity.	Rheumatoid arthritis.	1 course 0·1 gramme (12 dose). 1 course 0·2 gramme (12 dose).	Pain worse; refused further treatment.	Severe diarrhœa after third and fourth injections.
XXIII	F.	45					4 doses 0·1 gramme.	Unaltered; treatment stopped by patient.	
XXIV	M.	53	6 months.	—	Hyperacidity.	Rheumatoid arthritis.	1 dose 0·05 gramme. 10 doses 0·1 gramme.		
XXV	M.	33	3 months.	—	Not examined.	Rheumatoid arthritis.	4 doses 0·05 gramme each.	Marked improvement.	None.
XXVI	M.	33	3 years.	15	Not examined.	Rheumatoid arthritis.	12 doses 0·05 gramme.	Marked improvement.	None.
XXVII	M.	35	3 years.	45	Not examined.	Rheumatoid arthritis.	9 doses 0·05 gramme.	Slight improvement.	Generalised papular dermatitis.
XXVIII	M.	34	4 years.	35	Hypoacidity.	Rheumatoid arthritis.	6 doses 0·05 gramme.	Slight improvement.	None.
XXIX	F.	61	12 years.	30	Achlorhydria.	Rheumatoid arthritis.	12 doses 0·05 gramme.	Marked improvement.	Exfoliative dermatitis.
XXX	F.	41		30	Achlorhydria.	Rheumatoid arthritis.	16 doses 0·05 gramme. 2 doses 0·05 gramme.	Increased pain and refused further treatment.	None.

A course generally consisted of 12 doses of 0·05 gramme.

It is to be noted that all the hæmorrhagic conditions occurred in females. Skin reactions occurred in either sex, the worst occurring in a male (Case LXIX).

Age does not appear to affect the occurrence of reactions, as a young female (Case VII) and a patient in the fifth decade (Case XIV) both suffered from hæmorrhages. Old cases of disease, of ten or more years' standing, often reacted very favourably, but only when the therapy was continued for two or more courses. We have had no experience of different reactions to different compounds, as reported by Hartfall and Garland.

The Results of Gastric Analysis Compared with the Occurrence of Reactions.

The following figures are interesting: achlorhydria and hypoacidity were found in 48 cases, in 16 of which reactions occurred; normal acidity and hyperacidity were found in 22 cases, in two of which reactions occurred. It appears from these figures that an absence or diminution of free acid in the stomach predisposes to reactions.

Details of a Fatal Case.

The one fatal case was Case LXII.

A female, aged thirty-two years, had had infective arthritis for five years and had had many different types of injections. She had responded favourably to other methods; but gold was given to make sure of the complete subsidence of the disease. Insulin and glucose had been extensively used.

We attribute this fatality to too large a dose, as 0·2 gramme was administered for the second dose of the second course, and it was after this that uterine hæmorrhage commenced. No amidopyrine or related drug was used in this series or in this particular case, so that drug reactions are not incriminated.

The following are the results of the laboratory examinations.

Blood Count: The red blood corpuscles numbered 880,000 per cubic millimetre, and the hæmoglobin value was 20% (Sahli). The red corpuscles showed some punctate basophilia, and there were some polychromatic forms. No megalocytes were seen, and the majority of the corpuscles were normal in size. An occasional poikilocyte was seen. No nucleated red cells were seen. No platelets could be found on the films. The white blood cells numbered 3,000 per cubic millimetre, 72% being neutrophile cells, 27% lymphocytes, and 1% monocytes. Of the neutrophile cells, 24 were band forms and three young forms. Every neutrophile cell showed intense toxic changes in the cytoplasm.

The day before death and after blood transfusion and other treatment the blood count fell to 620,000 red corpuscles per cubic millimetre, and 2,400 leucocytes. No platelets were seen.

The Urine: The urine was examined and in immediate films there were many chains of streptococci, which on culture proved to be *Streptococcus viridans*. No pus was present in the specimen.

Blood Culture: The blood culture also gave a pure growth of *Streptococcus viridans*. The patient was given "Prontosil", pentose nucleotide and blood transfusions without effect.

Case XLII was another case of hæmorrhage in which the patient hovered between life and death for weeks. In her case no dose was greater than 0·1 gramme, and only 0·3 gramme was administered in all. Hæmoptysis was severe. Tuberculosis was excluded by X ray and clinical examination.

These severe complications caused us to reduce our dosage so that reactions would be more controllable and less severe, as such a fatality causes one to reconsider the advisability of gold therapy.

It is a fact that patients who have reactions usually evidence pronounced amelioration of the disease, a fact noted by Driver and Weller in skin diseases, and also by Fehlow[39] in arthritis.

In practice it is difficult to know whether to proceed after the slighter reactions, because of the danger of precipitating pronounced and serious reactions, and it is here that blood counts and other laboratory examinations may be of assistance. The quantitative estimation of the number of cells showing punctate basophilia is being undertaken to judge whether this is of any assistance in gauging the degree of toxicity or saturation.

The Red Blood Cell Sedimentation Rate Before and During Treatment.

The red blood cell sedimentation rate is generally reduced after a course of successful gold therapy; but in some instances, even though clinical improvement is present, the sedimentation rate is only slightly lowered or even increased.

In Case XXXIII there was a sedimentation rate of 30 in one hour on September 24, 1936, and 24 on December 29, 1936, although clinical improvement had been spectacular.

In Case XXVII there was a sedimentation rate of 29 on October 9, 1936, and 31 on December 29, 1936, although clinical improvement in the size of the joints and diminution of pain and stiffness had been pronounced.

In Case VI there was a sedimentation rate of 18 on October 19, 1936, and two months later there was a reading of 38, although much clinical improvement, both local and general, had resulted. It is also of interest that this patient had a severe skin reaction of the lichenoid type during this interval.

The sedimentation rate sometimes lags behind the clinical improvement, as in Case XIX it was 18 on September 24, 1936, and 15 on December 24, 1936, although practically all symptoms of arthritis had disappeared.

In Case XXX the sedimentation rate was 11 on July 9, 1936, and 14 on December 14, 1936, yet clinically a cure had been effected and the patient was completely free of all pain and stiffness.

The sedimentation rate does not appear to bear a constant relationship to the improvement under gold therapy; but, generally speaking, patients with a low sedimentation rate before treatment have responded clinically more quickly than those with a high sedimentation rate.

All the patients who suffered from hæmorrhagic complications had high sedimentation rates before the commencement of treatment, and all were females. The figures in these cases were as follows:

	Sedimentation Rate.
Case VII	37
Case XIV	36
Case XXXIII	30
Case XLII	35
Case LXII	40

We also noticed that all these patients were of the pale, cyanotic type with vaso-constriction; in some cases there was pronounced sweating of the hands, but in others this feature was not so marked.

Dosage.

In the early part of this investigation 0·1 gramme of "Myocrisin" was given once a week until 2·0 grammes had been given; but reactions became so severe (in one case ending fatally) that all doses were reduced to 0·05 gramme once a week for twelve doses, with an interval of one month before the second course commenced, or the doses were gradually diminished by giving an injection every 14 days, then 21 days and later 28 days, until all symptoms and signs had vanished.

It is obvious from the literature that the early doses were too large, and many grave complications followed these heroic doses. Attempts to minimize reactions by dissolving the compounds in oil have proved to be abortive.

The arthritic patient appears to be more sensitive to gold therapy than the tuberculous, a fact that is not in favour of the common origin of both diseases, which some Continental workers consider likely.

Only "Myocrisin" (watery and oily suspensions) was issued in this series, and, owing to difficulty in handling the oily suspension, only the watery suspension has been employed for some months.

Forestier lays down the following rules for chrysotherapy:

1. Whatever gold salt is employed, treatment should be carried out by a regular series of doses, with intervals for rest, during a period of at least one to two years.
2. Apply treatment as soon as possible after the onset of the disease.
3. Check at regular intervals by means of blood examinations.

Forestier has seen cases which did not respond to small doses improve with large, and some in which one type of salt was inactive and another successful. He also notes that arthritic patients are more sensitive to injections of gold salts than tuberculous patients, and suggests that it is probably because the allergic state is more pronounced. On the other hand, they respond most favourably to relatively small doses of gold salts. When doses are greatly increased a high proportion of untoward incidents appears, observations which are borne out by our experience.

Hartfall and Garland say that it has been frequently asserted that the toxicity rate is higher with intravenous than intramuscular injections; but they always doubted this, and in their large experience "Lopion", a preparation for intravenous use, has shown the lowest toxicity.

Adjuvant Treatment to Chrysotherapy.

The adjuvant treatment is not given in great detail, as this article mainly concerns chrysotherapy. Many observers, including Pemberton, Hollbrook and Hill, also Buckley, have stressed the constitutional basis of the disease and advised adequate measures from this viewpoint. The general measures used in our series depended upon the type of individual and the effect of the disease on the system. The patient exhibiting such features as loss of weight, cyanosis of hands and feet and lips,

pallor, sweating of hands and feet, night sweats (a possible tuberculous basis being eliminated by careful diagnosis and, if necessary, tuberculin tests), rapid pulse, extreme tiredness, fatigue on the slightest exertion, anorexia, sleeplessness, severe atrophy and tremor, symptoms which, as Douthwaite has pointed out, resemble hyperthyreoidism, will frequently not react to gold treatment unless adequate daily rest, insulin and glucose, and a plentiful supply of vitamins and a well-balanced and full dietary, with an adequate supply of fresh milk, preferably unpasteurized, are given. In our experience it is in this type of case that severe reactions have occurred with gold therapy.

Those patients who exhibit features of hypothyreoidism are given thyreoid extract, often with dramatic results; but undoubtedly gold therapy helps these patients considerably. There are many cases of rheumatoid arthritis in which the skin is dry and subcutaneous œdema is present in the hands, but the patient is not fat and manifests no symptoms of hypothyreoidism. Very small amounts of thyreoid extract, such as 0·0075 gramme (one-eighth of a grain), are useful in such cases; it is precisely in this type that a dramatic improvement under chrysotherapy can be almost always forecast. It has been in this type, in which even after constitutional, local and medicinal treatment only slight progress has been made, that remarkable progress under gold therapy has occurred, sometimes after only six or seven injections, at other times during the second course.

Diminution of gastric acid content is treated by the administration of hydrochloric acid, either alone or combined with *Liquor Ferri Perchloridi*, especially if pus and a large quantity of mucus are present. Lavage of the stomach every second day with sodium bicarbonate solution (one drachm to a pint of water), followed by normal saline solution, was also used in some cases. This may have to be continued for many months. We noted that some patients with anacidity were irritated by hydrochloric acid and were given alkalis for a period and later tried again with hydrochloric acid combined with pepsin, with more success.

Anæmia was combated by iron and arsenic, and sometimes patients were undoubtedly helped by a preparation, "Neo-bovinine", which contains liver, iron and vitamins.

Insulin and glucose (ten units of insulin night and morning, and two to three ounces of glucose dissolved in one pint of water, allowed to cool, and the juice of one orange or lemon added, with or without pineapple or passion fruit) were given to patients of the pale, cyanosed, sweating type. Insulin shock is occasionally seen, and the patient is warned of the symptoms and told to have one-third of the glucose solution one hour after the last dose of insulin, which is generally given about 6 p.m.

Histamine, in a dose of 0·0014 gramme (one-forty-fourth of a grain), was given hypodermically daily in a large number of cases of achlorhydria and hypoacidity.

Vaccine was rarely used in conjunction with gold treatment, but had been often used before chrysotherapy was instituted. Patients with subcutaneous œdema of the ankles and feet, but no renal damage or myocardial damage, often developed albuminuria and signs of renal damage with even small doses of gold. Careful examination of the urine in these cases is necessary to avoid renal damage, and it is as well to commence with 0·01 gramme and gradually to increase to 0·05 gramme.

Ovarian extract has been tried when the arthritis has begun during the early or latter part of the menopause; but no result has been apparent from its use.

The Treatment of Complications.

General Treatment.—All chrysotherapy was stopped immediately a reaction occurred. As some authorities advise continuing in spite of complications, we stress the point of complete withdrawal of the offending drug as the safest course.

Special Treatment.—Sodium thiosulphate has been recommended; but we have used it in doses of 4·0 grammes (one drachm) every four hours, orally and also intravenously, without any improvement. Calcium gluconate or some other form of calcium has been used and is believed to be of value; but in one of our cases enteritis appeared each time gold was used, with or without ten cubic centimetres of calcium gluconate solution. Mental depression in this case was so severe that the patient gave up all treatment.

Ascorbic acid has been recommended; but in one of our cases of hæmorrhage it made no difference and did not prevent recurrence when another injection of gold was given. The most important preventive in our opinion is the use of small doses so as to prevent the severe reactions. Reactions are perhaps unavoidable at present; but with experience their severity can be ameliorated.

"Collosal Sulphur", given hypodermically, in a dose of 1·0 to 2·0 cubic centimetres twice a week, has helped the disappearance of the rashes. In one patient (Case LXIX) the skin rash proved to be most resistant and extensive in certain areas on the abdomen and legs, and yielded only to repeated doses of ultra-violet radiation.

Blood transfusion may be necessary in the hæmorrhagic conditions, and pentose nucleotide in a dose of ten cubic centimetres daily, with or without adrenaline, when neutropenia occurs. In one case of uterine hæmorrhage curettage and packing for twenty-four hours were necessary.

The Avoidance of Reactions.

The undoubted benefit of chrysotherapy in the alleviation of pain and the improvement of the arthritic condition generally makes it imperative either to find some new compound which is less toxic or to minimize reactions in some other way.

It is probably impossible to avoid all reactions at present; but a reduction in their severity should not be difficult. Small doses at the commencement of treatment, together with regular pathological examinations, will help in the avoidance of severe reactions and probably eliminate fatalities.

The cold, clammy, cyanotic type of patient with rheumatoid arthritis is the type in which hæmorrhage has frequently been present as a complication. The only death due to gold occurred in this type of case. One patient (Case XLII) had severe hæmoptysis after five injections, a total of 0·3 gramme of the gold salt; another (Case VII) reacted to one injection of 0·05 gramme, which, when repeated one month later, caused the same hæmorrhages from the mouth and uterus. These cases were all of the same type, and we have therefore come to regard gold therapy as dangerous in this particular clinical group; if used, it must be carefully controlled by frequent full pathological examinations. The administration of insulin and glucose is the sheet anchor of treatment in this particular variety and must precede or accompany gold therapy.

Two patients with œdema of the feet and ankles, without clinical cardiac or renal damage, developed signs of renal damage during treatment, and we have come to regard this type of patient as especially prone to this complication. No permanent damage resulted in either of these cases. In one case, exhibiting hypotonia and albuminuria, "Eschaton", in a dose of 1·0 cubic centimetre a week, aided the muscular and renal condition.

Some authorities suggest that calcium gluconate is of value; but it made no difference in any of our cases, either in the prevention or treatment of complications. Glucose in large doses has also been recommended, but seems of little value. In Case LXII, which ended fatally, the patient had taken glucose continuously for twelve months, and also large quantities of calcium.

Slot, who emphasizes that gold therapy is only an adjuvant and that septic foci must be removed if possible, suggests that "Collosal Sulphur" should be given in a dose of 4·0 cubic centimetres (one drachm) twice a day, with liver extract, to lessen the risk of reaction.

Cabot[40] notes that with the use of any heavy metal it is wise to eliminate any focus of infection or any intercurrent infection, both of which predispose to generalized dermatitis. In the fatal case in this series the patient had all septic foci removed four years before death.

Clarke,[41] when treating pulmonary tuberculosis with "Sanocrysin", prohibited smoking and used daily mouth washes throughout the treatment, to prevent stomatitis.

Franklin, as a prophylactic against complications, gave patients an ounce of glucose at the time of each injection and, where possible, eradicated foci of infection, especially septic foci, believing that these predisposed to stomatitis.

In most of our cases the foci of infection have been removed and stomach sepsis, if present, has been actively treated.

The Results in Seventy Cases.

The results of treatment in our series of 70 cases are as set out below.

Worse	7	
Unaltered	7	
Slightly improved	9	44
Greatly improved	35	
Cured	5	
Suffered recurrence	2	
Stopped treatment owing to complications or reactions	4	
Death	1	

It is obvious from these figures that improvement, slight to great, occurred in 44 cases out of 70 (approximately 63%) and that the percentage of cures was 7·5. Many patients classified as greatly improved might conceivably in a few more months be classified as cured; but it was necessary to be certain that no relapses occurred. Many in the great improvement class show only a very slight degree of residual arthritis, which practically does not interfere with their daily avocations.

Other observers have noticed that some patients are made worse or remain unaltered, and this is borne out by the above results; only a small percentage (5·7) of patients refused further treatment or stopped having treatment owing to complications.

The number of recurrences was small; but time may alter this figure. Only one death occurred, owing largely, we believe, to overdosage; but as it occurred in the second course, just after the recommencement of treatment, sensitization might have played some part.

These figures, so far as the cures are concerned, are far from miraculous; but in view of the large number greatly relieved, continuance of treatment is both desirable and justifiable, especially as this disease has overlaid the profession with a curtain of hopelessness and apathy. Chrysotherapy helps to dissipate the gloom of inactivity and to enlarge the therapeutic horizon.

We have already stressed the supplementary treatment as well as the importance of choosing the type of arthritis which will react favourably. Patients with pronounced malnutrition, sweating, cyanosis and rapid pulse are considered bad risks until improved by general treatment; but those showing dry skins, with or without cyanosis or hypothyreoidism, undoubtedly are the most favourable to treat and have given us the best results. We also wish to stress the importance of regular blood examinations and the apparent relation of achlorhydria to the occurrence of reactions.

Time and further experience alone will reveal whether these generalizations are of any value. One notable feature in patients exhibiting atrophic glossitis is the return of the mucous membrane to normal appearance. This has not occurred in every case, but has been noted sufficiently often to suggest that the gold aids recovery of the mucous membrane of the tongue. Whether it has any effect on the

gastric mucosa or mucous membrane of the intestines we do not know. Changes in the mucous membranes appear to form an important part of the pathology of rheumatoid arthritis.

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THE RESULTS OF THE USE OF GOLD SALTS IN ONE HUNDRED CASES OF PULMONARY TUBERCULOSIS.

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GOLD SALTS have been used at the Westwood Sanatorium for over two years in pulmonary tuberculosis as an adjuvant to other forms of therapy. I first used "Lopion" (Bayer); it is a sodium salt of auro-thiosinamine benzoic acid which is soluble in either distilled water or normal saline solution. I later used "Solganal" (Schering) intravenously and for eighteen months have finally used "Solganal B Oleosum" (Schering), an oily suspension of aurothioglucose, intramuscularly.

Gold salts were first introduced by Möllgaard, of Copenhagen, in 1924, and he used "Sanocrysin" (a thiosulphate of gold). Since then other gold salts have been used: "Oleo-Sanocrysin", "Krysolgan", "Solganal", "Solganal B", "Solganal B Oleosum", "Crisalbine" (gold sodium thiosulphate), "Myocrisin" (sodium auro-thiomalate), and "Allochrysin".

Dosage.

"Lopion" was given in the following doses: 0·01, 0·025, 0·05, 0·1, 0·25, 0·5, 0·75 gramme.

"Solganal B Oleosum" was given in the following doses: 0·01, 0·05, 0·1, 0·2, 0·3, 0·4 gramme.

Technique.

All urine is tested for albumin prior to each injection and should there be a trace of albumin, the injection is postponed until such time as the urine is clear. The usual course consists of six weekly injections, followed by an interval of six weeks to one month, when the course is repeated. The buttocks are used alternately for the injections; the part is cleansed with methylated spirit before the injection is given, allowed to dry, and after the injection tincture of iodine is painted over the site of the injection.

Sterilizing Needles and Syringes.

The syringe ("Record") and needles are placed in methylated spirit overnight; early the following morning they are placed on gauze on the sterilizer tray used for injections, and by the time I

administer the injections the syringe and needles are quite dry. I use a three cubic centimetre syringe to facilitate matters in view of the fact that the fifth and sixth doses contain three cubic centimetres of oil. If a smaller gauge syringe is used, the needle has to be left *in situ* and the syringe has to be filled with the rest of the solution. I use one separate needle for each injection, and when the injections have been administered for the day, the syringe is filled with methylated spirit, which is squirted through each needle in rotation to expel the gold residue. The syringe is taken to pieces and cleansed, and the needles are threaded with stylets. The needles used are of the "Empire" British-made rustless steel, with a good shoulder, which can be held tightly between the thumb and first finger of the left hand when an injection is being given.

Types of Cases.

The cases may be divided into three types as follows:

1. Early exudative type with a fair prognosis, the infection being of six to twelve months' duration (some patients had cavitation). In this group were fifty-two patients.
2. Exudative type, with an infection of well over twelve months' duration and with fibrosis. In this group were twenty-eight patients.
3. Chronic type. This group included twenty patients.

Complications.

Four patients had transient albuminuria, four had mild dermatitis, three had stomatitis.

Six patients suffered from rheumatism, and eight from ulcerated throat and enlarged tonsils; these symptoms disappeared.

One patient, suffering from cancer, was discharged with the condition unrelieved. One patient suffering from malaria was discharged improved. One patient gave a history of fracture of the skull; this caused headaches for about twelve hours after each injection. The headache was relieved with a powder of aspirin, phenacetin and caffeine.

Résumé of Histories and Clinical Symptoms.

The approximate length of time which elapsed between the first appearance of symptoms (as far as is known) and the patient's coming under treatment was as follows: in twenty-two cases the period was under six months, in thirty-six cases it was twelve months and over, in twenty-three cases it was two years and over, in nineteen cases it was five years.

The probable disposing cause was in twenty cases influenza, in twelve cases pneumonia, in five cases neglected colds, in forty-eight cases pleurisy. It is to be noted that pleurisy is a symptom in about 85% of pulmonary tuberculous infections.

There was a family history of tuberculous disease in about thirty cases.

The history of hæmoptysis was as follows: in forty cases it ranged from that of slightly stained sputum to severe hæmorrhage, in sixty cases there was no hæmoptysis.

In ninety cases there was loss of weight, from a few pounds to two stone and over.

Eighty patients had received previous sanatorium treatment, either in this or in other institutions.

The record of the daily average temperature was the following: in forty-five cases the temperature was normal, in fifteen cases there was an evening rise, in twenty-four cases there was an occasional rise of 1° F., in sixteen cases the temperature was higher.

Night-sweats, ranging in severity from slight to soaking, were present in nineteen cases.

Dyspnœa was observed during rest in twenty-four cases, and after moderate exertion in fifty-two cases.

In seventy-six cases the approximate amount of sputum varied between one drachm and a few ounces.

Laryngeal symptoms were present in twelve patients.

The involvement of the lungs was as follows: in twenty-five cases it was unilateral, in seventy-five cases it was bilateral, ranging from slight to severe.

Patients were discharged from the sanatorium with the pulmonary tuberculosis arrested in fifty-two cases, in thirty-one it was improved, in eight it was unrelieved. Deaths from tuberculous toxæmia numbered seven.

Conclusions.

Investigations indicate that injections of gold salts are a beneficial adjunct to other forms of therapy in pulmonary tuberculosis. If gold is given, the patients in the early exudative stages with formation of fibrosis do better; and gold should be tried in other types of the malady, since a number of the patients respond well to this type of treatment, inasmuch as weight is increased and sputum and cough are lessened or disappear.

Reports of Cases.

INJURIES CAUSED BY AUSTRALIAN SCORPIONS.

By H. FLECKER, M.B., Ch.M., F.R.C.S.,
Cairns, Queensland.

As it appears that reports of injuries caused by Australian scorpions, whose identities have been established, have not yet been published, the following notes concerning the clinical histories of victims stung by three different North Queensland species, all belonging to different genera and of two different families, should be placed upon record. All reports have been collected by the Registry of Injuries Caused by Plants and Animals in Tropical Queensland established by resolution at Cairns at a British Medical Association conference held there in March, 1935.

Urodacus Spinatus.

Dr. E. A. Cook, of Barcaldine, forwarded the fragments of a scorpion which had been crushed after it had stung a female child, aged five, on the sole of her foot on a dark night on December 26, 1935, after she had passed through a picket fence, on the inner side of which was planted a Vitex hedge, lit up by a street light. She put her bare foot directly on the scorpion, which immediately stung her. The father saw it and at once crushed it with his boot. He brought the remains along, under the impression that it was a trap-door spider, and rushed the howling

child to the hospital. Apparently the child was more upset at the alarm of the parents than by the actual pain, which was described as a sharp stinging feeling in the foot, lasting for two hours. No effect could be noted upon the skin and no general effects could be detected.

The scorpion was identified by Mr. L. Glauert, F.G.S., Curator of the Western Australian Museum, Perth, as *Urodacus spinatus*. A description of this species appears in the "Annals and Magazine of Natural History", Volume X, Seventh Series, page 370. The type specimen was obtained at Lawlers, East Murchison Goldfields, Western Australia (W. O. Mansbridge).

Mr. Glauert reports an instance in 1924 of a sting by an allied species, *Urodacus novæ-hollandiæ*, which produced "a very bad swollen finger" in a victim when digging around the pampas grass in a yard at Maylands, Western Australia.

Lychas Marmoreus (Koch) Kraepelin.

Dr. N. J. O'Connor, of Mareeba, sent a complete specimen on which a victim, aged thirty-eight, stood (probably barefooted—but this is not stated) on April 8, 1936, producing a puncture and swelling of the foot with induration, lasting twelve hours, and accompanied by nausea of a few hours' duration. The pulse rate was 100, but otherwise no other general symptoms were noted.

This scorpion is found in New Guinea and practically throughout Australia. A description of this species by C. L. Koch first appeared in 1845 in "Arachnida", Volume II, page 36.

Isometrus Maculatus (Geer) Keyserling.

Three instances of attacks by *Isometrus maculatus* are recorded, all from Cairns.

1. On April 3, 1936, a man, aged twenty-eight years, was walking bare-footed on bare ground beneath his house at Cairns, carrying a carbide light, when suddenly he felt a sting. A few minutes' search revealed the scorpion, a female, on the outside of a clean saucepan. The puncture mark over the head of the left fifth metatarsal was invisible, but there was a swelling about fifteen millimetres in diameter. The sting was very severe, lasting about a minute, followed by a burning sensation, not very severe, which was still present half an hour later. No general symptoms were noted.

2. On November 15, 1936, a man, aged twenty-five years, was sitting on the edge of his bed in Cairns, wearing "shorts" and sandshoes, when he felt something bite him on the calf of his left leg. The offending scorpion was discovered, and as he had returned from a fishing expedition on the Barron River, he thought he might have brought it with him. The pain was described as severe for fifteen minutes, being general over the whole of the calf, then becoming less severe and passing off two hours afterwards. The site of the sting was barely visible. No general symptoms were noted.

3. On December 4, 1936, a laundress, aged about forty-nine years, whilst handling clothes at about 6.15 a.m., felt a sting on the radial side of the middle phalanx of the right index finger. The offending scorpion was found. The actual site of the sting could not be recognized, but the pain extended right up to the shoulder and was still painful three hours later. No general symptoms were detected.

Thanks are due to the members of the Cairns Division of the Queensland Ambulance and Transport Brigade for assistance in recording the last three cases and collecting the specimens.

Although this species is widely distributed in tropical and subtropical lands, according to L. Glauert in 1925, three specimens obtained from Broome, Western Australia, and two males in the Macleay Museum, Sydney, presumably Australian, represent all the Australian specimens known at that time; but it is a rather common scorpion in Cairns, being found not only outside, but frequently indoors, in cupboards and under mats *et cetera*.

Comment.

Australian scorpions (Scorpionidia) belong to three families: (i) Scorpionidæ represented by the *Urodacus*, comprising mostly medium and large species up to 120 millimetres. (ii) Buthidæ, less than 45 millimetres. These are confined to Australia and South America south of the twenty-seventh parallel of latitude. (iii) Bothriuridæ, also small and less than 45 millimetres, represented by the *Lychas* and *Isometrus* of this series. *Lychas marmoreus* is described by L. Glauert in the *Journal of the Royal Society of Western Australia*, Volume XI, page 95, and *Isometrus maculatus* is described on page 117 of the same journal. Figures of each of the last two are to be seen on Plate I of Part 2 of "*Die Arachniden Australiens*", by Koch and Keyserling.

A special appeal is made to all practitioners practising in tropical Queensland to report all cases of injury, including the trivial injuries, to the registrar of the Registry of Injuries Caused by Plants and Animals, Cairns. It is particularly requested that, whenever possible, the plant or animal responsible, or portion of such, be secured and forwarded with the report.

Reviews.

DIGITALIS AND ITS USE.

DR. LUTEN'S book gives a remarkably complete and clear statement of the actions and uses of digitalis, and cannot fail to interest all who work in that field.[1] This includes all practitioners of medicine, and there is no doubt that all would benefit greatly from its perusal.

The early chapters are devoted to a discussion of the effects of the drug on ventricular muscle and on the auriculo-ventricular tissues and pacemaker, and the author insists on the importance of the direct action on ventricular muscle as the one that makes the drug so valuable. He discusses the views held by various authorities, and quotes widely in a most interesting argument, in which he concludes that the action on the junctional tissues is of little, if any, significance in the treatment of cardiac failure with auricular fibrillation, and that the slowing that takes place is due to the effect on the ventricular muscle. Such slowing is difficult to produce if heart failure is not present, except with very large doses, while brilliant results may be obtained in heart failure with normal rhythm without slowing.

A chapter is devoted to the toxic effects of digitalis, the variety of which is not usually recognized, and chapters on the effects on the blood vessels and the electrocardiogram are valuable. After a long debate on the indications for digitalis the author concludes that there is one indication only—"heart failure"—and the long chapter, following, on its use in special situations shows what precautions are needed and how states and diseases may modify the value of the drug.

A very long chapter is devoted to the dosage and method of administration, and this is one of the most attractive parts of the book. The author advises that digitalis, as the best known drug of the group, should be used exclusively in special circumstances, which will probably never arise, and he recommends a good preparation of powdered leaf as the best for routine use. This chapter is packed with valuable material, and stresses the undesirability of very large doses and the need to discover the optimum, not the largest non-fatal dose possible.

The book concludes with short chapters on contra-indications and dangers, prognosis, and finally a review of the conclusions, entitled "Therapeutic Theses." The whole work is of the highest standard, and gives a concise and clear review of the subject by an acknowledged master. It should be studied by all who use this powerful drug, and is by far the best study of the clinical use of digitalis of which we have knowledge. Throughout the book quotations from leading authorities and discussion of their views add greatly to the interest and the clarity of the argument, and there is a good bibliography.

[1] "The Clinical Use of Digitalis", by D. Luten, A.B., M.D.; 1936. London: Baillière, Tindall and Cox. Royal 8vo, pp. 246. Price: 16s. net.

The Medical Journal of Australia

SATURDAY, JUNE 5, 1937.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: Initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction, are invited to seek the advice of the Editor.

ANOTHER EXTRAMURAL ASSOCIATION.

NOT long ago an announcement was made in this journal that certain surgeons practising urology had banded themselves into the Urological Society of Australasia. The total membership of the society was small and the information vouchsafed about its activities was scanty. On April 27, 1937, there was constituted an Australian Orthopædic Association. Some particulars of this association are published at page 887 of this issue. The purpose of this body, as set out in its constitution, is twofold: the first is the advancement of orthopædic surgery; the second is "to provide a national and authoritative body of experts to act, advise and co-operate in all matters affecting the welfare of cripples, and the prevention and relief of crippling disabilities arising during peace or as the result of war". It is to be noted that active and associate members must either be members of the British Medical Association or eligible for membership of that body. Although this condition apparently does not apply to "corresponding" or "honorary" members, we cannot imagine that an executive composed of members of the British Medical Association would choose for corresponding or honorary membership any medical practitioner whose ethical conduct rendered him ineligible for British Medical Association membership. We doubt whether there are many surgeons whose practice is devoted exclusively to orthopædic surgery; in all probability, therefore, the membership of the Australian Orthopædic Association will be little, if any, greater than that of the Urological Society of Australasia. The formation of these two small bodies is to be regretted; but since no details of the constitution of the Urological Society are available, our remarks will be confined to the Orthopædic Association.

What is known as orthopædic surgery is, of course, merely a branch of general surgery; it is, however, a highly specialized branch. In some places orthopædic surgery is carried out by general surgeons; but this practice is becoming rarer, and most unbiased medical practitioners will probably agree that the results obtained by orthopædic surgeons justify their claim to special recognition. Those who have any doubts about the recognition of orthopædic surgery as a specialty will do well to turn to an address delivered by Dr. R. B. Wade at the inaugural meeting of the Section of Orthopædics of the New South Wales Branch of the British Medical Association and published in this journal as long ago as October 13, 1923. We can therefore understand the desire of orthopædic surgeons to advance their art, and to do this by conference and discussion. This would be possible if orthopædic surgeons took steps to form a special section of the British Medical Association. As a result of representations made by the Federal Council to the Council of the Parent Body, provision now exists for the formation of special sections for the whole of Australia devoted to the study of different branches of medical science. These sections will be so organized that those comprising them will have a right to determine the qualifications for membership and to admit to membership only those who have these qualifications. The orthopædic surgeons, in our opinion, should have formed such a section. It is to be noted that sections of the British Medical Association are for the study of the scientific aspects of medicine only and have no medico-political

activities. All the medico-political matters in which members of the Branches are concerned are dealt with by the Branch councils, or if they affect the Commonwealth as a whole, by the Federal Council. The second purpose for which the Australian Orthopædic Association has been created is obviously concerned with medical politics. If the Orthopædic Association agreed to act only through the Federal Council of the British Medical Association in Australia, no trouble might arise. We hold most strongly that the Branch councils and the Federal Council are the only bodies qualified to speak for the profession as a whole; since they can coopt experts to add special knowledge to the wide general view that they are always able to take of any problem, Branch councils and the Federal Council will always give more satisfactory advice than any body of experts conferring alone. Moreover, it would be disastrous if divergent views were given by the Federal Council and such a special body as the Australian Orthopædic Association. If the profession speaks on a matter concerning any aspect of the public welfare, it must speak with one voice and not with several.

Sufficient emphasis and reemphasis cannot be laid on the fact that the medical profession stands in greater need of strong organization and cohesion than it ever has. The whole social fabric is changing and the medical profession, with its constant duty to the public, must so order its comings and goings that it will meet the public need; it will do this with justice to its members and honour to its tradition by striving to maintain the objects of the British Medical Association and by fostering its strength. We hope that it is not too late for the Australian Orthopædic Association to reconstitute itself as a section of the British Medical Association embracing all the Australian Branches.

Current Comment.

PROGNOSIS AFTER RECOVERY FROM CORONARY THROMBOSIS.

ONLY recently has it been possible to speak with confidence of the prognosis in coronary thrombosis, a state of affairs dependent on the fact that the disease has been recognized as a clinical entity only within the past few years. The amassing of reliable statistics is a matter of time, and only two years ago, at the Royal Society of Medicine, a speaker put forward the view that nobody could speak with certainty upon the subject.

J. H. Palmer,[1] of the cardiac department of the London Hospital, presents a valuable analysis of 212 patients with coronary thrombosis who are known to have lived for three months or more after a first attack. The subjects were collected from both private and hospital sources and those of them in whom there was any doubt as to the diagnosis were rejected for the purposes of the investigation. Of these patients, 73% were classified as belonging to a hypertensive group; their blood pressures, either before or after the attacks, were in excess of 160 millimetres (systolic) or 100 millimetres (diastolic). In 200 of the patients, the size of whose hearts was estimated by radiographic methods, cardiac enlargement was present in 64% and was commonly associated with hypertension. Palmer strongly holds the view that hypertension may be disregarded in so far as its unfavourable prognostic effect upon coronary thrombosis is concerned, but is of opinion that the dangers of cardiac enlargement are of the first importance.

Of his total of 212 patients, 188 were carefully watched by Palmer for more than four years in order that their capacity for exertion might be assessed. In 55 instances the subjects were members of a so-called active group and led practically normal lives for their ages, but the remaining 133 were classified as belonging to a "restricted" group in which bodily activity was seriously curtailed. It was observed that in this latter class the proportion of persons with cardiac enlargement exceeded those of the active group with the same disability by 20%. The commonest causes of abridged activity were attacks of *angina pectoris* and dyspnœa during exertion; exhaustion, intermittent claudication and auricular fibrillation occurred with much less frequency. Age did not seem to be a factor in influencing the incidence of angina, which was found to be present almost equally in all decades between the fifth and eighth.

In 27·8% of the 212 patients (in 59 cases) there were second attacks of coronary thrombosis, in 5·2% a third, and in 0·9% (two cases) a fourth, one-half of these attacks occurring within two years of the first. Palmer's statistics as to the duration of life of these patients are of importance. Of the 212, no less than 102 were still under observation when Palmer wrote, 45 could not be traced, and of 65 known to be dead the average duration of life after the first attacks was four years and three months. These figures seem to indicate that the expectation of life following coronary thrombosis is better than many have imagined up to the present. It appears not unreasonable to hope that amongst patients who live for a period of three months after

[1] *The Quarterly Journal of Medicine*, January, 1937.

a first attack of coronary thrombosis, some 75% may expect to live to the end of the fifth year following the attack, and 40% until the end of the tenth year. In patients with hypertension, the prognosis would appear to be more favourable than in those with a blood pressure of normal height. It is interesting to note that amongst those of Palmer's patients who lived for more than ten years after the first attack, almost one-half were over sixty years of age at the time of onset. A probable explanation is that the amplified collateral circulation in the senile heart enables it to withstand the dangers of coronary occlusion.

Palmer is emphatic that arterial hypertension has no adverse influence upon the prognosis. The statement, attributed to Levine, that a fall in blood pressure following an attack is of favourable import is not corroborated by Palmer, nor is the dictum of Master that therapeutic efforts to reduce hypertension tend to prevent further attacks. Palmer, indeed, is of the opinion that the incidence of repeated seizures is greater in the non-hypertensive than in the hypertensive group of patients, and that the expectation of life seems to be rather brighter in those patients whose blood pressure is raised above normal. A sign of evil import, however, is cardiac enlargement. The prognosis is very much more unfavourable than in cases in which the heart is of normal size. Congestive heart failure, in Palmer's series, occurred only in cases associated with enlargement of the heart. The most prominent symptom of the enlargement is dyspnœa associated with exertion, and radiographic examination proved that the size of the heart was above the normal in 90% of the cases.

Of Palmer's patients, 25% were able to lead reasonably active lives. In the remainder, the most notable causes of restricted activity were anginal attacks and dypnœa on effort. The onset of anginal attacks after coronary thrombosis seemed to be in no way related to the height, high or low, of the blood pressure. These attacks afflicted some 40% of the patients before their first coronary thrombosis, and in about 60% of instances after it. In less than 10% did the angina fail to recur after a first attack, but the recurrence seemed in no way to affect the duration of life.

The gist of Palmer's findings would seem to be that the height of the blood pressure or changes in it following an attack of coronary thrombosis are of little moment from the prognostic point of view, and that cardiac enlargement has an important bearing on the curtailing of activity and of life, the more so when it is accompanied or followed by congestive failure. It may be assumed, therefore, that following an attack of coronary thrombosis a patient with a heart of normal size may expect to live a life approximately twice as long as that of the patient who suffers from cardiac enlargement after a like attack. Although, as has been said, a good deal of uncertainty may exist as to prognosis in this disease, it must be stated that Palmer's findings agree in the main with those of Hay and White, which were first published some three years ago.

SCHOOL MEDICAL INSPECTION IN VICTORIA.

Dr. Jane S. Greig, Chief Medical Officer of the Department of Education, Victoria, has issued the twenty-sixth annual report on medical inspection for the State. Dr. Greig is about to retire from the service of the department after many years of devoted service. The present report, which covers the years 1935-1936, will therefore be read with the greater interest; medical practitioners will join us in congratulating Dr. Greig on the work she has accomplished and will wish her well in the future.

The present staff of the department consists of seven medical officers, nine dentists, eight dental attendants, two temporary dental attendants, one school nurse, one temporary school nurse, and two disinfectors; all are full-time officers. The cost of the service is £14,740 8s. 5d. *per annum*; the salaries of the staff account for £10,627 5s. 11d., and other expenses require £4,113 2s. 6d.; in this cost clerical assistance is not included. During the year 1,675 teachers and 38,216 children were examined. School dentists treated 32,847 children and school nurses visited 9,923 homes.

In an extensive table Dr. Greig sets out the defects discovered in boys and girls attending State schools. Attention may be drawn to some of the more important findings. Of 15,549 boys examined in elementary schools 3·8% and among 15,814 girls 5·1% were found to have defective vision; 1·6% and 2·4% respectively were wearing glasses. Of 2,354 boys in high schools 3·8% and of 1,976 girls 6·5% had defective vision; 3·1% and 5·0% respectively were wearing glasses. Of 1,863 boys in technical schools 4·6% and of 122 girls 2·5% had defective vision; 2·4% and 3·3% respectively were wearing glasses. Of 376 girls in "girls' schools" 10% had defective vision and 3·5% were wearing glasses. Of the boys in elementary schools 1·0% and of the girls 2·4% had defective hearing; the percentages among high school and technical school boys and girls and among girls' schools varied from 0·6 to 0·1. Of boys in elementary schools 11·7% and of girls 18·1% had defects of the nose and throat, and operations were performed on 14·5% of boys and 11·5% of girls. Among the older children of high schools and technical schools the percentage of defects varied from 2·2 to 19·4, and the operation percentage from 23·1 to 33·7. These figures seem unduly high; at the same time the public has the satisfaction of knowing that defects in the children of the State are being remedied and that illness in later life is being prevented. It is interesting to note that the percentages of heart defects are 0·3 and 0·6 in elementary schools, boys and girls respectively, and 0·2 and 0·3 in boys and girls from high schools. It is somewhat disturbing to note that

3·4% of girls in elementary schools and 4·7% of girls in high schools are anæmic.

The dental treatment carried out on school children is most important. The total number of children treated during the year was 32,847; of these, 7,443 were treated by a dentist travelling by railway and 9,523 by officers in dental vans. The number of extractions of teeth of the first dentition was 61,118 and the number of fillings 5,645. The number of extractions of teeth of the second dentition was 8,894 and the number of fillings 35,200. General anæsthetics were given to 2,784 children (all in Melbourne), and 1,545 regulating plates were fitted.

Dr. Greig points out that every aspect of the child is considered—physical, mental and temperamental—and that appropriate guidance is given. She not unnaturally finds difficulty in seeing that suitable care is provided for special children in an educational system that is graded for normal children; she finds, however, that parents are often able to make the adjustments necessary for the child. The results of medical treatment are better than in years gone by, mainly because parents are more easily convinced of the necessity for it. This is more noticeable in work in the country, where travelling often occasions considerable difficulty.

Dr. Greig finds that three factors interfere with the health and well-being of the child and with his educational attainments. These are: insufficient food, excess of other work and insufficient sleep. Any discussion on these subjects would occupy far more space than can be given to them at present. Attention must, however, be drawn to the unfortunate plight of many children in the country who are compelled to undertake many home duties before setting out for school. These children are really attempting to carry two full-time jobs. Dr. Greig also finds that the health of girls is damaged by their spending two or three evenings a week at dancing classes and by frequent engagements at evening entertainments.

THE EFFECT OF HYPOGLYCÆMIA ON THE CENTRAL NERVOUS SYSTEM.

IT is curious how the toxic effects of newly introduced drugs and other preparations used in the treatment of disease are seldom regarded seriously until some years of experience in their use have accumulated. Insulin is a case in point. In the early days of the insulin treatment of diabetes it was thought that the dangers of overdosage with insulin were but slight and that in any case the symptoms were only transient. This is now known not to be true. The most varied neurological signs and symptoms have been observed in relation to severe degrees of hypoglycæmia, including loss of consciousness, which may be prolonged for a considerable time after the sugar level of the blood has been restored to normal. The actual changes occurring in the central nervous system are of interest, but the subject is not an easy one to study, as is pointed out by A. B. Baker and N. H. Lufkin.[1] It is essential that the brain be examined immediately after death to avoid the complicating factor of *post mortem* cellular changes. The fact that the clinical signs observed are extremely variable suggests that whatever the lesions are, they are widely scattered throughout the nervous system. Baker and Lufkin have summarized the literature on the subject and fail to find an agreement. The findings vary from little divergence from apparent normality to extensive changes in the cells, fibres and vessels, but damage to the nerve cells is generally reported.

The material for these studies has been derived from the few cases that have come to autopsy and from the experimental animal. Schereschewsky and co-workers produced hypoglycæmic convulsions in animals with insulin, and reported the presence of numerous petechiæ scattered throughout the cerebral hemispheres. Baker and Lufkin had the opportunity to carry out detailed observations on autopsy material obtained from three fatal cases. One patient was a young man who had suffered from proved hypoglycæmic attacks of great severity and in whom no abnormality had been found on exploration of the pancreas. A second laparotomy was performed, which he did not survive, and autopsy later revealed no lesion in any endocrine organ with the exception of a small hæmatoma in the head of the pancreas. Sections of the brain tissues showed definite alteration in many of its ganglion cells, such as loss of Nissl substance and nuclear fragmentation. Nearly all the sections also showed the presence of many old and new hæmorrhages, varying in size from small extravasations to tiny petechiæ, but actual ocular evidence of vascular damage was difficult to find. In another case, in which the symptoms had been less severe, similar bleedings were found, but more restricted in type and amount, though comparable cellular spoiling was again noted. In the third case there were also petechiæ and one considerable extravasation sufficiently large to cause permanent damage had the patient lived; cellular change was again seen. These cellular changes strongly suggested to the authors a *post mortem* origin; for example, the cells were often found to be difficult to stain satisfactorily with the usual routine stains, and it was thought desirable to carry out some animal experiments. In these investigations rabbits were given doses of insulin sufficient to cause hypoglycæmic convulsive attacks, which were terminated by the intravenous administration of glucose, so as to study the late effects of such attacks on the nervous system. Acute fatal attacks were studied similarly, and it was found that on comparing the ganglion cells in these animals' brains with those of normal controls it could not be said that the existence of hypoglycæmia during life had had any drastic effect *per se* on the

[1] *Archives of Pathology*, February, 1937.

nerve cells. Accordingly Baker and Lufkin believe that it is doubtful whether actual demonstrable cellular damage occurs in hypoglycæmia, though the occurrence of scattered petechial hæmorrhages is apparently constant. It must be pointed out, however, that in spite of the very small amount of actual nutritive requirements of the nerve cells, serious disturbances of function occur. Perhaps we are justified in assuming that full recovery of the nerve cells may usually occur once adequate supplies of nutriment are available; but we are still left to face the sequelæ attendant upon hæmorrhagic lesions in the central nervous system. These considerations are very important, for with the freer use of insulin and the greater activity of diabetic patients, who are no longer invalids, hypoglycæmia is no matter of mere academic importance. Further, with the introduction of the slowly acting insulin, such as the zinc protamine preparations, hypoglycæmia becomes even more vital a subject. It is essential that everyone handling a potent substance should understand its risks, for in that understanding lies the safety of its use.

CLONORCHIASIS.

THE lowly worm is despised. In song and story he receives no praise. Even the biologist who knows his helminths would call a contemptible person a worm rather than an amœba, say, or a coccus. It is sad that worms should be regarded with such opprobrium; for in truth they are among the most delightfully interesting of living creatures. Some of the life histories of parasitic worms are almost incredible. One of the many requiring complicated groups of conditions to complete their life cycles is *Clonorchis sinensis*, of the family Opisthorchidæ. This fluke inhabits the biliary passages of man, dog, cat, rat, mouse, camel and badger. Apparently it is not particular in its choice of definitive host, and possibly could be suitably accommodated in the biliary passages of even less distinguished animals than these. Its ova are passed in the fæces. The first intermediate host may be either of the snails *Bithynia longicornis* or *Parafossalurus striatulus*. Miracidia are hatched in the snail. After a period of development cercariæ escape from the snail and eventually encyst in the muscles of fresh-water fish of the family Cyprinidæ. The definitive host becomes infested through eating raw fish—a delicacy in China and Japan. H. F. Hsii and C. Y. Chow have recently investigated clonorchiasis in Canton.[1] After consulting records at Canton Hospital, they conclude that 11·4% of the inhabitants harbour the parasite. They also quote B. K. Liang as stating that 80% of 200 beggars examined *post mortem* were found to be infested. There are two main raw fish dishes in Kwangtung Province. One, *yii-sheng*, consists of thin slices of raw fish surrounded by different kinds of vegetables and delicacies, such as radish, peanut, salad, fruits, cooked duck or chicken, cooked crab or shrimp, mustard, oil *et cetera*. The best *yii-sheng* is said to contain thirty-one different spices. Many of the older Chinese believe that *yii-sheng* is very good for health. *Yii-sheng-chou* is a cheaper dish, with fewer trimmings, served with a bowl of hot rice congee, into which the slices are dipped. The culture of fresh-water fish is an important industry in Kwangtung, where it goes hand in hand with silkworm breeding. Excavations are made and the soil is thrown out to form high ground for the growth of mulberry trees as food for the silkworms. The excavations become pools, in which the fish are bred. Latrines are built over the pools. The fish are fed on silkworm pupæ and waste, dung, nightsoil *et cetera*. The mud from the bottom of the ponds is used as fertilizer. As an example of Chinese thrift, this would be hard to beat. The agriculturist-pisciculturist feeds his fish from his farm and his farm from his fish, and breeds *Clonorchis sinensis* without additional expenditure. Hsii and Chow suggest preventive measures, such as the sterilization of nightsoil; but they declare that the most urgent necessity is the education of the people, who are not aware that eating raw fish causes clonorchiasis.

[1] *The Chinese Medical Journal*, March, 1937.

A GYNÆCOLOGICAL CENTENARIAN.

FEW medical practitioners live to reach the century mark, so there is special significance in the congratulatory message of Seitz on the occasion of the hundredth birthday of Ferdinand Adolf Kehrer, who retired from the chair at Heidelberg in 1902.[1] Seitz recalls a successful case of Cæsarean section performed in a cottage by Kehrer in 1881, when he first used the incision devised by himself—a transverse one at the junction of the cervix and uterine body. His next contribution to the technique of the operation was the closure of the uterine incision by layers and not by interrupted through-and-through sutures. In 1897 he devised his method of tubal sterilization by resection of the tube and implantation of the ends under the peritoneum. Australian colleagues will join with their German *confrères* in paying their respects to one who has devoted an active and useful life of service to obstetrics and gynæcology.

THE ADELAIDE CONGRESS.

THE fifth session of the Australasian Medical Congress (British Medical Association) is drawing closer and members of the Branches are making their arrangements for their stay in Adelaide. The Executive Committee wishes to make it known that plenty of good accommodation is still available. Members who are in difficulty or who would like to have arrangements made for them are invited to communicate with Dr. Malcolm T. Cockburn, the Secretary of the Accommodation and Transport Committee, 107, North Terrace, Adelaide.

[1] *Monatsschrift für Geburtshülfe und Gynäkologie*, February, 1937.

Abstracts from Current Medical Literature.

PÆDIATRICS.

Banti's Syndrome in Childhood.

L. C. MARTIN (*Archives of Disease in Childhood*, October, 1936) describes and discusses four cases of Banti's syndrome. Banti's disease is said to be rare in children. The diagnosis is seldom made before one of the major symptoms, such as hæmatemesis or grave anæmia, has occurred. All conditions associated with splenomegaly in childhood must be excluded, and it must be remembered that the hæmopoietic system of a child is unstable and reacts violently to stimuli which would have little or no effect upon an adult. The reaction may take the form of splenomegaly, hepatomegaly, enlargement of lymphatic glands and varying degrees of anæmia. The two most important conditions to be excluded before a diagnosis of Banti's disease is made are syphilis and acholuric jaundice. Syphilis may simulate Banti's disease, as in one case described by the author, and hepatomegaly may accompany splenomegaly in acholuric jaundice. Hence use of the Wassermann test and estimation of the fragility of the red cells are essential. The author suggests that the term Banti's disease should be confined to those cases showing splenomegaly and secondary anæmia, with or without hæmorrhages and hepatic cirrhosis, but in which no known ætiological factor is present. Similarly, the term splenic anæmia should be applied to cases of Banti's syndrome in which some vascular disorder or specific infection can be recognized during life.

Creatine Metabolism and the Gonads.

PAUL KAHN AND NATHANIEL SMITH (*Archives of Disease in Childhood*, December, 1936) have carried out investigations with a view to ascertaining the age at which creatinuria ceases. Endogenous creatine has for a long time been recognized as a normal constituent of the urine of the infant and the child, whereas in the adult no creatine is excreted in the urine. It has been apparent that this change in metabolism occurs about the time of puberty, and it has been surmised that it may be associated with activity of the gonads. The children studied by the authors were confined to bed in hospital so that the diet and urinary output could be controlled, and they were given a standard diet during the whole course of the investigation. Forty-eight children (21 boys and 27 girls) were examined, and as a result the authors arrived at the opinion that creatinuria ceases between the ages of twelve and fourteen years. The authors quote the findings of Remen, MacNeal and Buehler in support of the decisive influence of the sex glands on the excretion of creatine, and conclude that it is only on this basis that the persistence of creatinuria during infancy and childhood and its more or less sudden disappearance at puberty can be satisfactorily explained.

Chronic Miliary Tuberculosis.

R. H. FISH (*Archives of Disease in Childhood*, February, 1937) reports the histories of ten children suffering from chronic miliary tuberculosis, four of whom recovered. At the outset the author points out that the diagnosis of miliary tuberculosis is not infrequently made on insufficient evidence. Before a diagnosis with a skiagram of the chest suggestive of miliary tuberculosis is accepted it must be shown, first, that the opacities seen in the picture are caused by tuberculous nodules, and secondly, that these nodules have resulted from a dissemination of organisms by the blood stream. A number of non-tuberculous conditions may simulate the X ray picture of miliary tuberculosis — pneumonokoniosis, carcinomatosis, bronchopneumonia or bronchiolitis, and chronic vascular congestion due to cardiac insufficiency. The implantation of the nodules may be a result of a dissemination of the disease via the air passages or the lymphatic vessels, and not by the blood stream. In five of the six fatal cases in the author's series the *post mortem* findings produced conclusive evidence of chronic miliary tuberculosis, and in the remaining case the X ray picture was characteristic and tubercle bacilli were found in the sputum. Both healed and healing miliary tubercles were demonstrated in microscopic section of the lungs. All intermediate stages could be observed between typical acute miliary tubercles and nodules of pure fibrous tissue. It was possible in many of them to demonstrate multiple tubercle bacilli; this excluded the possibility that the pathological changes were produced by toxins of dead organisms, as was suggested by Nicaud. The patients who recovered are of particular interest because of the course taken by the disease. The similarity between these and the six fatal cases is extremely suggestive. Tubercle bacilli were found in the sputum or gastric contents. Carcinomatosis may be excluded as practically never occurring in childhood; and the same applies to pneumonokoniosis. The persistence of stippling in the skiagrams over periods of many months excludes a non-specific bronchopneumonia, and the absence of cardiac lesions excludes vascular congestion. All four patients who recovered suffered at some period of the illness from definitely established extrapulmonary tuberculous lesions which could have arisen only as a result of a discharge of tubercle bacilli into the blood stream. The author emphasizes the fact that not only can no sharp line be drawn between acute and chronic forms of miliary tuberculosis, but also that it is frequently impossible to determine the prognosis in any given case at the outset. Treatment should therefore be considered in every instance. Rest is of the utmost importance. The child should be kept in bed until the stippling has completely disappeared from the skiagram. The children should be treated in the open air. The only other form of treatment used by the author was gold therapy, "Solganal" being given intramuscularly.

Lung Abscess in Children.

FRANK P. MATHEWS (*Archives of Pediatrics*, January, 1937) records twelve cases of lung abscess in children over a five-year period from 1929 to 1933 inclusive. In the selection of cases the definition of lung abscess is rigidly adhered to, namely, "a suppurative, non-tuberculous focus in the pulmonary parenchyma". The right lung was more frequently involved than the left, and the lower lobe more often than the upper. The more frequent involvement of the right lung supports the aspiration theory of invasion, for in childhood the calibre of the bronchi is relatively larger than later in life, and also the right bronchus is shorter than the left and more in line with the trachea. In the majority of cases a previous pathological condition or event could with reasonable certainty be established as a definite causative agent. The onset in general resembled that of any acute infection with the sudden appearance of high fever, chills, tachycardia, chest pain, cough and leucocytosis. Nothing very definite can be determined by auscultation of the chest. X ray examination is a much safer and surer source of information. During the acute stage patients should be treated in the same way as lobar pneumonia patients. If pus from the abscess is available, it should be carefully studied bacteriologically, and intensive searches should be made in the sputum for tubercle bacilli. When the diagnosis is established and the child is in a condition to stand it, daily postural drainage should be instituted. If a few weeks of waiting and postural drainage have not been successful and the child seems to be entering the subacute stage, an attempt should be made to drain the abscess either through the bronchoscope or by thoracotomy. The author draws attention to the fact that lung abscess in children has increased in recent years, owing, among other things, to wholesale tonsillectomy and accurate diagnosis.

Erythrocyte Sedimentation Rate in Scarlet Fever.

J. S. COOKSON (*British Journal of Children's Diseases*, December, 1936) records the results of erythrocyte sedimentation rate tests performed at various stages of scarlet fever in seventy-six cases. He concludes that the test is a simple and sensitive indicator for determining the progress of a patient with scarlet fever. A

considerably raised rate on the fourteenth day of the disease means either that complications have already occurred or will occur. The test is useful in differentiating the types of albuminuria occurring in scarlet fever. A high rate means that the patient has acute nephritis which has an accordingly worse prognosis than the benign types of albuminuria. Most complications which occur in scarlet fever cause a raised rate before they give rise to signs and symptoms, and also whilst the complication lasts. The exceptions are benign albuminuria and serum reaction. There is no definite relationship between other blood changes recorded and the erythrocyte sedimentation rate in scarlet fever. The test is a useful index of the efficacy of treatment.

ORTHOPÆDIC SURGERY.

Fractures of the Os Calcis.

MELVIN S. HENDERSON (*Surgery, Gynecology and Obstetrics*, December, 1936) discusses the results obtained in 54 consecutive cases of fracture of the *os calcis* at the Mayo Clinic. Of these, 22 were recent fractures, and in seven of these the results were excellent, the patients returning to full duty in three to four months; only one patient claimed that he was completely disabled two years after the accident. The author gives as the reason for this apparent good result the fact that comparatively few of these were industrial compensation cases and that a long interval of time had elapsed after the accident, during which progressive gradual improvement had taken place. Thirty-two cases were old fractures in which the time between the occurrence of the fracture and the patient's arrival at the clinic varied from twelve weeks to twenty-six years. The cause of the disability in 21 of these cases was traumatic arthritis of the talo-calcaneal articulation, for which triple arthrodesis was advised. The advice was accepted by only three patients, because of fear of the loss of earning power incidental to operation for a disability which had been of long duration, and also because most of the patients felt they were gradually improving. The author disagrees with the statement that unless the talo calcaneal joint is broken into there will be no subsequent arthritis in that joint. He attributes the arthritis to altered stresses and strains following alteration in weight-bearing lines due to fracture through the body of the *os calcis*. The ideal of anatomical restoration of fragments is not easily secured in most cases owing to the comminution which generally accompanies their injury. The most satisfactory line of treatment is the moulding advocated by Böhler, followed by the use of a Kirschner wire through the proximal fragment, which gives purchase to forked pegs incorporated in a plaster, applied to the limb with the knee flexed so as to produce a downward thrust on the proximal fragment. The author mentions three relatively common sequelæ which are amenable to operative treatment. First, removal of an exostosis which may form on the inferior surface; secondly, removal of callus which may form along the region of the peroneal groove and which almost impinges on the malleolus; and thirdly, distortion of the talo-navicular and calcaneo-cuboid articulations with traumatic arthritis, which should be treated by fusion of these joints in addition to the triple arthrodesis. This procedure leaves the patient with as much lateral mobility as he had before operation, and compensatory movement soon develops in the forefoot.

The Intervertebral Disks.

J. S. BARR (*The Journal of Bone and Joint Surgery*, April, 1937) writes that it is only within recent years that lesions of the intervertebral disks have been recognized as a cause of low back pain with sciatica. He reports forty verified cases of such lesions and reviews the literature. The usual history is of sudden onset of local pain following an injury, varying degrees of anæsthesia and paraplegia and sphincter involvement. The common pathological finding has been a fibro-cartilaginous mass posterior to the intervertebral disk which presses on the anterior aspect of the cord or *cauda equina*. The author prefers to describe the condition by the term "rupture of the intervertebral disk". Of 53 cases verified by operation and histological examination at Massachusetts General Hospital, nine were in the cervical region, three in the dorsal, forty in the lumbar region and one in the sacrum. Schmorl noted the presence of small nodules (*Knorpelknötchen*) in 15% of spines examined as a routine at autopsy. In 65% of the cases in the lumbar region the lesion was between the fourth and fifth lumbar vertebræ. In 21 of these the disability followed immediately on trauma, of which the most common type was the result of lifting a heavy weight. It has been determined experimentally that the disk retains its elasticity only until the *annulus fibrosus* is ruptured and the *nucleus pulposus* extruded. Such an event happens under severe pressure if the annulus is merely punctured by a needle. In many of the cases studied there were remissions, but the symptoms became more disabling with each attack. Pain was the major symptom in every case, and occurred in order of frequency in the posterior and lateral parts of the thigh, postero-lateral part of the calf, lumbo-sacral region, gluteal and sacro-iliac regions, and the lateral border of the foot. There is a tendency to press on one root only, and thus there is an absence of objective sensory changes. The location of the lesion cannot be inferred from the distribution of the areas of referred pain. Kyphosis due to muscle spasm was noted and was relieved by operation. Tenderness and limitation of movement were also noted. The knee jerks were normal in all cases, but occasionally the visceral reflexes were interfered with. The usual X ray examination gave no information of the site of the lesion. In the localization of the level of the lesion, however, lipiodol examination gave correct information in 90% of cases; it is essential to use 4·5 to 5·0 cubic centimetres in order to demonstrate "filling defects". In some of these cases the total protein of the spinal fluid was within normal limits. The extruded nucleus is removed by a transdural route and the lipiodol is removed at the same time to avoid arachnoiditis. There is an immediate and complete relief of sciatic pain.

Splenic Extract in the Treatment of Fractures.

THOMAS WHEELDON (*Surgery, Gynecology and Obstetrics*, December, 1936) describes his results in the experimental and clinical use of splenic extract in promoting union of fractures. He quotes Miwa's experiments showing that increase in splenic hormone causes decrease of serum calcium and that splenectomy causes increase in serum calcium in contradistinction to the effects of parathyreoid hormone. Increase of thymus hormone produces results similar to those of splenic hormone. He maintains that he has clinical, radiological, laboratory and histological evidence that oral administration of splenic extract induces calcium deposition in the callus of fractures. He divides his clinical cases into four series: (*a*) those in which bone graft operations were performed and in which union occurred more quickly and more firmly than would ordinarily have been expected; (*b*) fractures which were treated by the administration of splenic extract and the use of crutches alone, and in which he claims there is radiological evidence that splenic extract stimulated the deposition of calcium; (*c*) those cases of malunited fracture three or four months old in which splenic extract was given after proper reduction and in which there was an increased rate of calcium deposition; (*d*) a case of *fragilitas ossium* with multiple deformities, some of which resulted from non-union following osteotomy and in which union occurred and the general condition of the bones improved after the use of splenic extract. Fresh fractures were treated with splenic extract, and unusual rapidity of calcification was noted. The author concludes that splenic extract would appear to hasten the healing of fractures, both fresh and ununited, and that it appears to do so by inducing an increased calcium retention.

British Medical Association News.

SCIENTIFIC.

A MEETING of the South Australian Branch of the British Medical Association was held at the Darling Building, University of Adelaide, on March 25, 1937, DR. A. F. STOKES, the President, in the chair.

Cardiac Pain.

DR. K. S. HETZEL read a paper entitled "Cardiac Pain" (see page 853).

DR. GUY LENDON drew attention to the frequency of functional cardiac disorders, and to the necessity for the distinction between true angina and other forms of precordial pain.

DR. E. F. GARTHELL congratulated Dr. Hetzel on his comprehensive treatment of the subject. He drew attention to the fact that coronary thrombosis and infarct formation could occur in the absence of pain, also that an apparently text-book case of coronary thrombosis might not receive *post mortem* corroboration. In reference to 10% of patients showing electrocardiographic changes, he was quite sure that this figure would be materially reduced if serial records were made. The absence of a *Q* wave in Lead IV nearly always signified a myocardial infarct. At present localization of infarcts was accurate in less than 60% of cases, but this no doubt would alter with experience. He reiterated Dr. Hetzel's warning of the dangers of giving adrenaline in these cases. Although spasm of the coronary arteries was not yet a proved occurrence, it was a very probable one. In connexion with this, it was interesting to note that the administration of acetyl-β-methyl-choline sometimes produced the changes typical of coronary thrombosis as exhibited in Dr. Hetzel's tracings. In a series of twenty odd cases of coronary thrombosis occurring in men under forty, it was a significant fact that all the patients were heavy smokers.

DR. RAY HONE said that he had listened with agreement to Dr. Hetzel's remarks on what should be told to a patient suffering from angina. He wished, however, that the speaker had gone further and made a protest against the telling of the patient that his symptoms of pain in the cardiac region were due to a "weak heart" before certain evidence of some cardiac defect had been obtained. In many cases the patient had nothing wrong with the heart, but having once been given this label, it became increasingly difficult to convince him in after years that he had a normal heart. A further point in Dr. Hetzel's paper that had interested Dr. Hone was his reference to anæmia as the cause of anginal pain. Whilst these cases were not particularly common, they did occur, and this cause should always be borne in mind in the investigation of a patient presenting anginal symptoms. The person who developed such symptoms from severe secondary anæmia generally had the cause recognized on account of the appearance. In the case of pernicious anæmia, however, the appearances were often misleading and did not suggest the underlying disease. Dr. Hone quoted one patient seen some years previously. The patient had been treated for *angina pectoris* for twelve months. The onset of symptoms of subacute combined degeneration of the cord then caused the patient to seek further medical advice. With appropriate treatment for his pernicious anæmia, the anginal symptoms disappeared, and for some years the patient had been able to lead an active life again without further trouble.

As several speakers had mentioned the large doses of morphine needed to give satisfactory relief from the pain, and recourse to chloroform had been necessary, DR. E. COUPER BLACK asked whether "Sodium evipan" given intravenously would not be useful in these cases, and better than chloroform.

DR. JOHN HAYWARD inquired whether the blood sedimentation rate was of any assistance in determining the healing of the infarct in coronary thrombosis.

Dr. Hetzel replied that he thought it was of value, and if the blood sedimentation rate had not recovered at the end of eight weeks, he would regard it as an indication for future rest in bed.

DR. C. B. SANGSTER asked Dr. Hetzel whether he had ever encountered the symptoms of cholelithiasis with biliary colic and *angina pectoris* in the same patient. Dr. John Parkinson, of the London Hospital, had related several such cases, and said that gall-stones might give rise to pain resembling closely *angina pectoris*. For the pain of this anginal nature due to gall-stones he had used the term "biliary angina". It had been found that cholecystectomy in such cases very frequently gave relief, not only from the biliary colic, but also from the angina-like pain. Probably this latter pain was not the true angina of effort, but merely a form of "pseudo-angina", which was a bad term, and which was consequent upon the lesion in the gall-bladder and not related to diminution in calibre of the coronary vessels.

DR. A. F. STOKES, from the chair, thanked Dr. Hetzel very much for his interesting and instructive paper, but in doing so remarked that Dr. Hetzel had said very little with regard to prognosis, which was rather an important matter from the general practitioner's point of view. Dr. Hetzel's statement that acute pain in the jaw might be one of the symptoms in coronary occlusion brought to his mind a patient, a chronic asthmatic, to whom he was called one night. On arrival the patient was dead. The wife stated that his only complaint was agonizing pain in the lower jaw. Death had been due to a probable cardiac catastrophe, but at the time he, Dr. Stokes, had not been able to account for the acute pain in the jaw.

Dr. Hetzel, in reply to Dr. Couper Black, said he had no experience of giving "Sodium evipan" to relieve the pain of coronary thrombosis, but he saw no reason why it should not be useful. In the literature he had noted similar drugs being given with definite relief of the pain when other measures had failed.

To Dr. Sangster Dr. Hetzel replied that he personally had not seen the association of biliary disease and *angina pectoris*. In the last few years there had been many reports of this association and of the striking benefit which had accrued from surgical treatment of the gall-bladder disease.

In conclusion, Dr. Hetzel said that he regretted that most members had agreed with what he had said, for he had hoped to arouse discussion on certain points and especially on the justifiability of surgical measures in the treatment of intractable *angina pectoris*.

A MEETING of the New South Wales Branch of the British Medical Association was held at the Renwick Hospital for Infants, Sydney, on November 19, 1936. The meeting took the form of a series of clinical demonstrations by the members of the honorary medical staff. Part of this report appeared in the issue of May 29, 1937.

Gastro-Enteritis.

DR. W. BRODIE GRANT showed a baby, aged fourteen and a half months, who was admitted to hospital on November 9, 1936. The illness began with diarrhœa lasting for one week, with the passage of fœtid, greenish-coloured motions four to five times a day. The child did not vomit, but was thirsty.

There was a previous history of pylorospasm at the age of six weeks. Physical examination revealed a baby in moderately good general condition. During the four days which followed the child's admission to hospital, the general condition showed a gradual improvement. On November 10 the bowels were opened three times a day; the stools were green and relaxed, and contained mucus and blood. By November 14 the bowels were being opened twice a day and the stools were yellow and relaxed.

Treatment consisted of 10% glucose solution given for forty-eight hours and whey for twenty-four hours. Milk and water and sugar were then added, and finally sago and groats. The child's present condition was very good, the bowels being opened twice a day and the stools being yellow and relaxed and containing mucus.

Dr. Grant's second patient was a boy, aged ten months, who was admitted to hospital on October 28, 1936, with a previous history of bronchitis, pertussis and pneumonia two months previously. The present illness began with diarrhœa and vomiting lasting for four days. On physical examination the throat was seen to be clear. There were numerous rhonchi on both sides of the chest. The bowels were opened as often as seven times a day, the stools being green and brown and relaxed and containing mucus.

At the time of the child's admission to hospital it was very ill and was vomiting continuously. Saline solution injections were given rectally and returned. At midnight four ounces of saline solution were given intraperitoneally, and this method was used during the succeeding two days. Treatment consisted of adrenaline and brandy; 10% glucose solution with whey, and weak milk and water were added to the previous diet. At the time of the meeting the stools were still slightly green and curdy.

Pneumonia.

DR. VICTOR CONRICK showed several patients, who had suffered from pneumonia, in order to illustrate the assistance and confirmation of diagnosis given by early X ray examination. The second patient, G.A., illustrated that in a certain small percentage of cases no physical signs were evident until late, if at all. When "Carbogen" was used, infants took well to it and rested well during its use. The rate of flow was five litres per minute.

Dr. Conrick's first patient was a baby, aged seven and a half months, who was admitted to hospital on November 12, 1936. The child's illness began on the night before its admission with restlessness, fever and cough. Convulsions occurred three hours before its admission and chloroform was given.

On examination the child was found to have convulsions; the head was retracted and the chest appeared clear. The child was given a mustard bath. Lumbar puncture yielded 25 cubic centimetres of clear fluid which was under greatly increased pressure. The fluid was found to contain pneumococci. The bowel was washed out. Rectal injections of 5% saline solution were given every four hours. Hypodermic injections of two minims of adrenaline in three minims of saline solution were given as required and bromide of potash and chloral hydrate were given in doses of three grains and one and a half grains respectively. X ray examination revealed consolidation of the bronchopneumonic type at the bases of both lungs. The child made good progress and at the time of the meeting its chest was clear. Dr. Conrick drew attention to the pathologist's comment on the absence of pus cells in the cerebro-spinal fluid and pointed out that on this account the child could not have had a pneumococcal meningitis.

Dr. Conrick's second patient was a baby, aged fourteen months, who was admitted to hospital on November 12, 1936. The child had suffered from bronchitis six months previously. The history of the present illness was that nasal discharge had been present for one week. The child had grunting respirations, severe cough and vomiting. Examination revealed a severe pneumonia with a complete absence of physical signs typical of that condition. Dr. Conrick pointed out that the child had done very well and that abnormal physical signs were still absent.

Dr. Conrick's third patient was a baby, aged fifteen months, who had been admitted to hospital on November 8, 1936, suffering from pneumonia and old pertussis. According to the previous history the child had suffered from bronchopneumonia on two previous occasions—from August 8 to August 18, and from August 19 to November 2, 1936. On each occasion the mother had taken the child out of hospital before cure was completed, and readmission was necessary.

The history of the present illness was that the child had been feverish and had refused food for one day; no vomiting occurred. On examination the child was found to be emaciated and otherwise in poor general condition. The tonsils were congested. Dulness, tubular breath sounds and crepitations were present at the base of the left lung. After several X ray examinations a collapsed lobe of the lung was found behind the heart shadow.

Dr. Conrick's fourth patient was a baby, aged twenty-two months, who had been admitted to hospital on November 1, 1936. The child had been ill for one week with cold and cough. On examination its general condition was moderately good. Grunting respiration was present and numerous fine crepitations were audible. X ray examination revealed some evidence of limited local consolidation. The child was making a good recovery and the chest was almost clear.

Dr. Conrick's last patient was a baby, aged seven months, who had been admitted to hospital on November 6, 1936. The family history was clear, and the previous history was that the child got gastric attacks with teething. The present illness began with malaise for three days and heavy breathing for one day. The child was restless and crying and vomited once. The stools were green and contained curds. On examination the child had grunting respiration. The pharynx was inflamed. Harsh breath sounds were present at the apex of the left lung. The neck was not rigid and no squint was present. The knee jerks were exaggerated and unequal. The child had a peculiar cry. Lumbar puncture yielded 15 cubic centimetres of clear fluid which was under increased pressure, and which was reported on pathological examination to be sterile.

On November 17, 1936, the child's general condition was worse. Abdominal distension was present; hypodermic injections of pituitrin were given and the rectal tube was passed. Examination revealed extensive dulness of the right lung posteriorly, with tubular breath sounds of the right apex in front. A diagnosis of empyema was made. A double paracentesis was performed without an anæsthetic, pus being aspirated from both sides. After this the child was able to rest. Pituitrin and enemata were again given for the abdominal distension and sodium bromide and stimulants were also given. "Carbogen" was given at the rate of five litres a minute. Dr. Conrick pointed out that X ray examination revealed a dense area on the right side adjoining the heart shadow; probably a small effusion was present in the lesser fissure of that side.

Congenital Heart Disease.

DR. D. VICKERY showed two patients who were suffering from congenital heart disease. He said that it was commonly taught that the prognosis of a congenital heart lesion would depend on the degree of cyanosis present. Roughly speaking, the more marked the cyanosis, the more serious the lesion. On the contrary, in many of the most serious cases of congenital heart defect no cyanosis whatsoever was present. There were two other signs in congenital heart disease which had as great a bearing on prognosis as cyanosis, and they were dyspnœa, especially after mild exertion, such as crying or sucking, and failure of the child to develop normally.

The two patients shown illustrated these points. The first patient had severe dyspnœa or rather a rapid grunting respiratory rate most marked after crying or on slight exertion. He also showed retardation in bodily development. There was no cyanosis, but occasionally "pale turns" occurred. X ray examination revealed a large globular heart and the clinical signs and symptoms favoured anything but a good prognosis.

The second patient, on the other hand, had cyanosis, a loud murmur, but no dyspnœa. He was developing normally and had no other signs of cardiac embarrassment or defect. X ray examination revealed a shadow of an apparently normal heart. The prognosis appeared to be distinctly better in this case.

Sclerema.

Dr. Vickery also showed a child, aged six months, who was suffering from sclerema. The child had been admitted to hospital three days previously with a diagnosis of "thrombosis of both legs". Little history was known except that the child was weaned at two weeks of age and had been fed on "Lactogen", but had not thrived. The birth weight was seven pounds. On admission to hospital the child had typical brawny induration of the tissues of both legs, also a brawny mass in the left thigh as seen in sclerema. The temperature was subnormal. X ray examination revealed a "blurred" condition of the fatty layer in these situations, but no typical deposits of calcium salts.

Dr. Vickery showed another patient suffering from sclerema, a child, aged two months, who had first come to the out-patient department of the hospital ten days previously with hard brawny swelling of both legs from the knees downwards.

The mother stated that the child had had four or five watery motions per day since three weeks of age. It was a full-time baby and appeared healthy at birth. The mother first noticed a brawny purplish swelling in the cheeks; this spread to the shoulders and down the arms to the hands, gradually disappearing in the upper part and appearing further down. After a few days' interval the mother noticed another brawny reddish blue patch on the side of the chest, then a large area on the buttocks, and it spread down both thighs and now was involving both legs from the knees downwards. On admission to hospital the child had a brawny swelling involving both lower limbs symmetrically, reddish blue in colour, not pitting on pressure. The child's temperature was subnormal. The heart and lungs were clear. The X ray appearances were typical of sclerema.

Dr. Vickery pointed out that in acute sclerema a progressive induration of the subcutaneous tissue took place. This by degrees involved the whole surface of the body. This acute form was more often seen in premature or marasmic infants with some gastro-intestinal or toxic affection. In stronger full-time infants a less acute form took place, usually associated with some mild gastro-enteritic disturbance or some toxic process. It generally occurred from soon after birth up to the sixth month of life.

It was evidenced by the occurrence of isolated hard thickenings of irregular shape and size in the subcutaneous tissue. The parts chiefly affected were the cheeks, shoulders, buttocks, thighs and calves. The overlying skin was adherent to the indurated subcutaneous tissue and was sometimes purplish or deep red in colour. The indurated tissue was composed of masses of fat and myriads of acicular crystals of neutral fat, traversed by somewhat dense trabeculæ of connective tissue. Lime salts were deposited in the fat at times and these might give a typical X ray appearance. The condition was generally associated with subnormal temperature.

The prognosis in these full-time stronger children was good, but in premature and marasmic children the condition was often fatal. The cause was probably a disorder of fat metabolism, brought about by a mild toxic process in these infants.

In the two patients shown the condition was of the less severe type and the patients were rapidly showing improvement. Treatment appeared to consist in applying warmth and keeping the body temperature within region of normal. Fluids should be given and thyreoid extract appeared to be of assistance.

Congenital Absence of Left Pectoral Muscle.

Dr. Vickery also showed a child, aged nine months, who was first brought for medical advice at the age of two months, because there was a "recurrent" swelling of the left side of the chest wall and the left side of the chest did not look normal. On examination the patient was a normal healthy looking breast fed child, but had congenital absence of the left pectoral muscle, with absence of portion of the underlying ribs, causing a slight "hernia" or rather "swelling", noticed mostly at times of crying or with any great respiratory effort. X ray examination revealed an incomplete ossification of the fourth rib in that situation and the outline of heart suggested a congenital variation of the great vessels, probably a right sided aorta.

Dr. Vickery said that a congenital absence of a pectoral muscle was a well recognized congenital deformity, but in association with absence or defect of the underlying rib and with a cardiac abnormality such as was suggested, it was extremely rare.

Skiagrams.

DR. E. W. FRECKER displayed seven series of X ray films, taken from the routine practice of the hospital, to illustrate the course and treatment of pneumonia in infants. Each of these series showed the X ray examination of an individual pneumonia patient, repeated at weekly intervals from the time of admission to discharge or death. These progressive X ray examinations revealed many points of interest. Throughout the past winter numerous patients, suffering from pneumonia, were repeatedly examined in this fashion. It was found that few lesions ran true to text-book type. Recurrent attacks involving separate areas of the lung were responsible for many prolonged relapses. The first attack was sometimes seen to be lobar in distribution, followed by a general infection of both lungs, typically bronchopneumonic, suggesting that the primary infection was secondarily distributed throughout the whole bronchial tree. Intermittent and temporary collapse at the bases of the lungs often occurred and accounted for many sudden changes in both the X ray appearance and the physical signs. Effusion and empyema were frequent complications, but were detected at an early stage and confirmed when necessary by exploratory puncture. The site of puncture was usually determined from a consideration of postero-anterior and lateral films. Lateral films were taken in all instances and proved exceedingly valuable. Interlobar effusions and middle lobe pneumonia on the right side were particularly well shown by this means. The X ray appearance was found to be of little value in prognosis, as some of the worst looking lesions were shown to resolve completely in a few weeks.

Cleft Palate.

DR. W. J. WEARN showed a cinematograph film illustrating the prosthetic treatment of a cleft palate baby. First, a day-old baby was shown with a complete double hare-lip and cleft palate; then an impression was taken of the mouth slowly so that each detail of the technique employed could be seen. The impression obtained was then held up to view beside the baby's mouth. Then the plaster cast was shown, then the vela sucking plate was constructed and now the two-day-old baby was seen feeding quite normally out of an ordinary feeding bottle—the sucking plate was inserted and taken out several times to illustrate the ease of manipulation. Then an older baby was shown on the film, inserting its own plate and then taking out the plate. Several other cleft palate children were shown inserting and taking out their appliances. The old-fashioned method of pipette feeding of a cleft palate baby was also shown to illustrate the difficulty of feeding these babies without a sucking plate.

Vascular Nævi.

DR. J. C. BELISARIO showed a number of children who were suffering from congenital nævi.

A female, aged eleven weeks, had a raised vascular nævus of the strawberry variety situated on the back and having a diameter of approximately two centimetres. Two applications of carbon dioxide snow for ten seconds on each occasion had been applied since October 16, 1936. The redness had now faded from the lesion, which, however, was still raised. The raised part would next receive treatment with radium, which would obliterate the larger and more deeply seated blood vessels. This combination of treatment appeared on the whole to produce the best cosmetic results, as there was less likelihood of later

scarring than when either method was used alone. The most important feature in the treatment of vascular nævi as a whole was the fact that they should be treated as early as possible. The earlier treatment was performed, the better were the cosmetic results, as the lesions tended to become more and more radio-resistant with age.

A female, aged nine weeks, had a raised cavernous hæmangioma with a reddish surface, approximately three centimetres in diameter, and situated on the left parietal region. Three radon needles, each containing 1·5 millicuries of radon, in two centimetres of active length and screened by the equivalent of 0·5 millimetre of platinum, were buried in the lesion on November 11, 1936, and left *in situ* for three days. This should be sufficient to obliterate the cavernous part of the lesion. If any superficial redness should remain, a surface radium applicator would be employed.

A female, aged three months, had a cavernous hæmangioma of approximately two centimetres diameter, situated on the right side of the scalp. On October 21, 1936, two radon needles, each containing one millicurie of radon in 1·5 centimetres of active length, filtered by the equivalent of 0·5 millimetre of platinum, were inserted in the lesion for three days. The treated area could now be seen to be flattened and fading. This improvement would continue for several months.

A female, aged five months, had a cavernous hæmangioma, approximately 1·5 centimetres in diameter, on the left side of the lower lip. One radon needle, containing two millicuries of radon in one centimetre of active length and filtered with the equivalent of 0·5 millimetre of platinum, had been inserted for two days, two weeks previously. Radiation by means of needles was eminently the method of choice in this area in a baby owing to the difficulty of keeping surface applicators in position. In this area also, X rays would be extremely difficult to employ. The end result in this case should be quite good.

A female, aged seven weeks, had a cavernous hæmangioma about 2·5 centimetres in diameter, situated on the scalp. A half strength radium plaque with four-tenths of a millimetre of monel metal filter had been applied for four hours on April 29, 1936. On June 24, 1936, the superficial redness was blanched, but the deeper bluish area composed of the larger vessels still remained raised above the surface. Two needles, each containing two millicuries of radon in one centimetre of active length and filtered with the equivalent of 0·5 millimetre of platinum, were buried in the lesion for three days. The lesion was now quite flat, and the surrounding hair which was temporarily epilated was commencing to grow.

A male, aged seven months, showed two untreated reddish vascular nævi of the strawberry variety, one on the back, and one on the left side of the abdomen of approximately 1·5 centimetres in diameter. Another lesion, about the same size, over the left clavicular region, received an application of carbon dioxide snow for ten seconds one week previously. A forth lesion of the deep cavernous type was situated anteriorly to the right shoulder. The latter lesion would receive treatment by the burial of radon needles in its substance. The two untreated strawberry nævi would receive treatment with radium plaques with or without previous applications of carbon dioxide snow.

A female, aged twelve months, had an elevated strawberry nævis, about 1·5 centimetres in diameter, situated on the tip of the nose. A half strength radium plaque with 0·1 millimetre of monel metal filter was applied for two hours on May 6 and on July 15, 1936. The finished cosmetic result in this case could be seen to be quite satisfactory.

A female, aged nine weeks, exhibited the subepidermal variety of *nævus flammeus*, situated on the chin. This type of lesion did not as a rule respond well to treatment. A small area had been treated with an application of carbon dioxide snow, and another small area would be treated with a surface application of radium. If either area showed definite improvement after treatment, the treatment employed in the most improved area would be used over the whole lesion. If no improvement followed, further treatment would probably be unattended by beneficial results. Ultra-violet rays or a fine fulguration spark had found favour in the hands of some authorities.

A female, aged four and a half months, had a raised strawberry nævus, about three centimetres in diameter, situated on the abdomen. Carbon dioxide snow was applied for ten seconds on October 23, 1936. This was followed by a superficial erosion which healed with some irregular pigmentation, leaving one small vascular area to which another application of carbon dioxide snow would be applied. The final result in this case would not be quite so good from a cosmetic point of view as could have been obtained by a radium plaque. This, however, was of little significance owing to the situation of the nævus.

A female, aged one year and eleven months, had a brilliant red, flat strawberry nævus, about one centimetre in diameter, situated on the vermilion border of the centre of the upper lip. On May 27, 1936, the equivalent of a half strength radium plaque was applied unfiltered to the lesion for three-quarters of an hour. The present cosmetic result appeared to be perfect.

A female, aged four months, had a cavernous hæmangioma, about three centimetres in diameter, situated on the right side of the umbilicus. Two needles, containing three millicuries of radon in three centimetres of active length, filtered by the equivalent of 0·5 millimetre of platinum, had been inserted for three days five weeks previously. The lesion had considerably faded and flattened. Dr. Belisario said that this improvement would continue for approximately two to three months. On the whole, with the exception of the *nævus flammeus*, the best results were obtainable by carbon dioxide snow alone in the very superficial variety of vascular nævus. In the more elevated type, radium surface applicators gave the best results and might be assisted by previous applications of carbon dioxide snow. The deeper or cavernous hæmangiomata were best treated with radium needles, assisted if necessary by surface radium applicators or carbon dioxide snow, to blanch the superficial blood vessels. If both carbon dioxide snow and radium were employed, the snow should always be used before and not after radiation, otherwise unnecessary scar tissue might result. X rays could, of course, be employed instead of radium. A short general anæsthetic was necessary for the burial of radon or radium needles, also for the administration of X rays.

Medical Societies.

THE AUSTRALIAN ORTHOPÆDIC ASSOCIATION.

AT a meeting held in Sydney on April 27, 1937, the Australian Orthopædic Association was constituted. Dr. E. B. M. Vance occupied the chair.

According to the constitution of the association the purpose of the association is twofold. The first is the advancement of orthopædic surgery, and the second is "to provide a national and authoritative body of experts to act, advise and co-operate in all matters affecting the welfare of cripples, and the prevention and relief of crippling disabilities arising during peace or as the result of war".

There are to be five classes of members, active, associate, corresponding, honorary and emeritus. Active membership is to be limited to those practising orthopædic surgery exclusively and it is required that any such member shall be a member of the British Medical Association, or shall be eligible for membership of that association. Associate members are to be surgeons or physicians who "maintain a continuous interest in orthopædic surgery or who are actively interested in those branches of medical and surgical science closely allied to orthopædic surgery". Associate members are also required to be members of

the British Medical Association or to be eligible for membership. Corresponding membership may be conferred by the executive committee on distinguished surgeons not residing in Australia. Honorary membership may be conferred by the executive on distinguished members of the medical profession in Australia or abroad. Members who on resignation are deemed worthy by the executive committee may be elected to emeritus membership.

Candidates for election as members or associate members are to be balloted for at a general meeting of the association and candidates must be proposed and seconded by two active members. It is required that the proposer and seconder shall be personally acquainted with the candidate and be responsible for his eligibility.

Foundation Members.

The two sections of the constitution dealing with foundation members are reproduced *verbatim*.

> At the first meeting called for the formation of this Association all those persons attending who are eligible for Active membership and who at such meeting shall signify their willingness and all those persons who at such first meeting shall be selected by a majority of such persons attending the same and who within three months after the date of such meeting shall signify their willingness shall become Active members of the Association but such member shall within three months after such meeting pay his entrance fee and first annual subscription as is hereinafter in Clause 19 provided.
>
> During the period of three months from the date of the first meeting of the Association any person eligible for active membership may apply by writing addressed to the Honorary Secretary in such form as the Executive Committee shall approve for admission as a member without nomination and may be admitted to membership by the Executive Committee. Persons so applying shall furnish such evidence of their qualifications and eligibility and/or a thesis as the Executive Committee may require. The Executive Committee shall have the absolute right to refuse to admit to membership under this Clause any applicant of whom it shall not approve and it shall not be required to state or furnish any reason for such refusal.

Entrance Fee and Annual Subscription.

Until otherwise determined active members are to pay an entrance fee of two guineas and an annual subscription of one guinea. Associate members will pay no entrance fee, but will pay an annual subscription of one guinea.

Office-Bearers.

It was decided at the inaugural meeting that those whose names appear below should be asked whether they would consent to fill the following offices.

President: Dr. E. B. M. Vance.
Vice-Presidents: Dr. N. D. Royle, Dr. A. V. Meehan, Dr. L. O. Betts.
Honorary Secretary: Dr. A. R. Hamilton.
Honorary Treasurer: Dr. H. A. Sweetapple.
Editorial Secretary: Dr. L. Macdonald.
Executive Committee: Dr. D. J. Glissan, Dr. J. R. Hoets, Dr. L. Teece, Dr. S. H. Scougall.

Obituary.

JOHN PHILIP O'BRIEN.

DR. T. K. R. ALLEN, senior medical officer of the Repatriation Department in South Australia, has kindly forwarded the following account and appreciation of the life of the late Dr. John Philip O'Brien.

John Philip O'Brien was born in Melbourne some forty-three years ago. He was educated at the Christian Brothers' school and afterwards at the University of Melbourne, where he graduated as Bachelor of Medicine and Bachelor of Surgery in 1917. He was immediately sent to Perth Hospital for a short period and then went on active service, mainly on the Hospital Ship *Karoola*. Late in 1919 he joined the staff of Number Seven Australian General Hospital at Keswick. In 1921 he became a full-time medical officer with the Repatriation Commission on its staff at the General Hospital, Keswick. Later he was part-time medical officer and conducted a successful private practice at Grassmere.

I first came in contact with John O'Brien some two years ago and found him a most conscientious officer and true friend. Many returned soldiers will never forget his unfailing tact and kindness, and have cause to gratefully remember his surgical skill. His untimely and sudden death will cause a gap in a large circle of friends and patients which is impossible to fill. John O'Brien, as he was affectionately known to his many friends, was always a prominent clubman and was a foundation member of the Adelaide University Club, which is now the Amateur Sports Club. It can truthfully be said of him that to know him was to love him.

Dr. O'Brien was a most popular officer on the repatriation staff, and the South Australian Branch as a whole join with me in extending their sincerest sympathy to his young widow and his sons, John, aged twelve, and Philip, aged fourteen months.

Sir Henry Newland writes:

In common with the many friends of John O'Brien, I deplore his passing in the prime of life. I first made his acquaintance at the end of the War, when the Repatriation Department organized a section of plastic surgery, and he became resident medical officer at Keswick. His death ended a happy association of seventeen years. He was a most reliable, conscientious and business-like colleague.

In administering the duties of his office, his treatment of the soldier broken in the War was tinctured with a genuine and practical sympathy, but he never forgot his duty to the State.

After acting as resident medical officer for some years, he married, and on my advice started practice on the Anzac Highway. His venture was attended with success from the first for his practice grew rapidly. Busy though he then was with his practice and his repatriation duties, he found time to organize the evening entertainments of the Mount Osmond Country Club.

In the early days of the depression, when South Australia was passing through one of the greatest political crises in her history, John O'Brien identified himself heart and soul with those opposed to the forces of disruptive socialism. When any issue was in doubt he ever loved to play his part.

John O'Brien had a very distinct personality. His superior manner and mode of expression were accentuated by his erect carriage. These traits were but a veneer which concealed a generous, genial temperament and a great capacity for friendship. It follows from what I have written that John O'Brien cannot fail to be greatly missed.

ROBERT GILLESPIE SCOTT.

WE are indebted to Dr. Gregory Sprott for the following appreciation of the career of the late Dr. Robert Gillespie Scott.

By the sudden and unexpected death of Dr. Robert Gillespie Scott, Hobart has lost one of its most esteemed and successful medical practitioners, and I feel it is a great privilege to be able to add my tribute to the memory of one who was not only a helpful colleague, but a sincere and treasured friend.

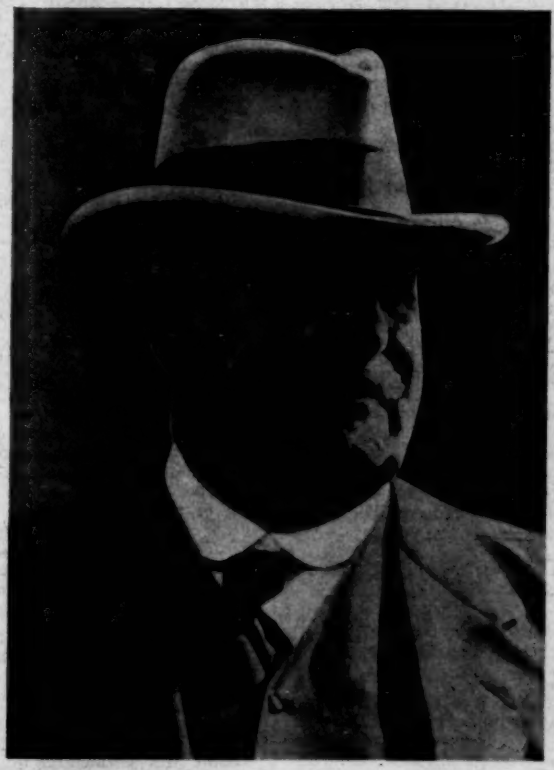
I first met him soon after my arrival in Hobart, nearly half a century ago, at the manse of his father, Reverend

James Scott, D.D., and I am proud to think from that time to the date of his death our professional relationships were ever of the most harmonious nature and the bonds of friendship were strengthened as the years increased.

Scott began his active medical career as a resident in the Hobart General Hospital, and his splendid service there secured for him a very large and lucrative practice soon after putting up his plate in Macquarie Street, Hobart. He was a man that could have made a success of any specialty in medicine, but he chose the wider field of general practice, believing that in this way he could render the best service in the profession he loved so well.

He was a profound reader, and his cultured mind, fine presence and charming manner soon gained the confidence of his brother practitioners as well as of his patients.

It was not long before he became an assistant and then full honorary medical officer at the General Hospital. It was while he held the latter position that we became more closely associated in hospital work. I do not hesitate to say that no one could have had a better or more helpful colleague. He was a well-informed physician, and the accuracy of his diagnosis could rarely be questioned. In the surgical side one found his opinion always helpful and valuable before coming to a decision.



In spite of his large practice he was a most constant and devoted worker at the hospital, and it can be truly said of his hospital work that he never spared himself, nor did he think any sacrifice too great when the welfare of his patient was at stake.

Though of a retiring nature, with an aversion to publicity, he was always ready to accept his share of responsibility in any matter concerning the profession. He was President of the Tasmanian Branch of the British Medical Association on more than one occasion; President of the Medical Council and of the Medical Defence Association. In all these positions he proved himself a wise counsellor—cautious and resourceful. His opinions and advice from the chair were always acceptable because of his uprightness and fairness, but it must be said, while he was tolerant of the opinions of others and very forgiving, he gave no countenance to anyone violating ethical principles or professional traditions.

In early days Scott was a keen sportsman, but the exigencies of a large practice rarely allowed him to have more than a few days with the gun amongst the quail, and later a round of golf. He was particularly fond of the game and was president of the Kingston Golf Club for man years.

A son of the manse, he was a loyal supporter and a prominent member of the Scots Church, and held many church offices. It was truly said of him that "his Christian character made him a man of influence and weight". To his church and such charities as appealed to him he gave freely, and to the poor he was ever generous. He was a devoted son to his aged and widowed mother, and was never happier than when paying her the daily visit. He was a delightful companion and one of the friendliest of men, and to those he knew well he would give freely out of his stores of memories of his academic days in Edinburgh.

Amongst the medical men of Tasmania and beyond, Robert Gillespie Scott will long be remembered with affection and esteem. I hold as sacred the days we had together and the friendship with him I was privileged to enjoy. We mourn our loss, but are thankful for his exemplary life and for his peaceful passing on.

Dr. W. E. L. H. Crowther writes:

One by one the elders among our general practitioners are passing, and this week we mourn Robert Gillespie Scott. At such a time memories of the man himself, as he appeared to a schoolboy, come back to me. He was always a friend of my father and a most welcome visitor in our home. Forty and more years ago it was their custom to spend several days in the year shooting together, usually during the quail season. These expeditions meant a start at about 6 a.m. on a frosty May or June morning in a wagonette to one of what were then several good shooting areas about twenty miles from Hobart. On such days, with Dalwood and Dentith (the grooms) on the box, and myself and several dogs, with the two principals in the body of the vehicle, the drive out and back was never long enough. Dr. Scott was even then a very heavily built man, though most active on his feet, and the best of companions. I can hear his kindly, most musical voice as I write this. Chosen by examination as a Tasmanian scholar, before leaving for the University of Edinburgh he taught for a short period at Horton College, Ross. Horton was then a purely residential public school, situated in the Tasmanian midlands a few miles south of Ross. Even then he was a keen naturalist, and his leisure was spent ranging the swamps and hills, where he closely observed the bird life and, an intrepid climber, made an excellent collection of their eggs. This collection he afterwards gave to me. For many years Dalwood, his groom, who after my grandfather's death went to Dr. Scott and drove for nearly fifty years, had the best turned out doctor's buggy and horses in Macquarie Street, and won with them many prizes at the Hobart Show. His spaniels, too, especially "Mac", were as well known as his hacks.

In the fullness of time, as a resident at the hospital and in practice in the town, one learnt to admire more and more his complete sufficiency. He went steadily to the end of the difficult task he had in hand. Fortune seemed to stand at his side with surgery; his cases always did well; but in a difficult obstetric case (in my opinion the ultimate test of a medical man) he was at his best. Calm and capable, he knew when to act and what to do for his patient's welfare.

Some years ago, when in less active work, he told me how much he regretted he knew so little of geology, and he started to study this difficult science. Only last year he became a member of the R.A.O.U. in order to make contact again with the study of Australian bird life.

By his passing we all lose a genial friend and a great gentleman, and Hobart will no longer see its best known medical man passing on his daily round.

DONALD MURRAY ROSS.

We regret to announce the death of Dr. Donald Murray Ross, which occurred on May 20, 1937, at Manly, New South Wales.

HARRY CHARLES COSTELLO SHAW.

We regret to announce the death of Dr. Harry Charles Costello Shaw, which occurred on May 22, 1937, at Sydney, New South Wales.

Correspondence.

THE SECTION OF OBSTETRICS AND GYNÆCOLOGY AT THE ADELAIDE CONGRESS.

SIR: The programme for the Section of Obstetrics and Gynæcology includes discussions on the following subjects:

1. Puerperal and post-abortal sepsis.
2. Indications for the induction of labour.
3. Methods of induction of labour.
4. Pulmonary tuberculosis in relation to marriage.
5. Sterility.
6. Carcinoma of the cervix from the general practitioner's point of view.

In addition there will be occasional papers on:

1. Acute puerperal inversion of the uterus.
2. Anæsthesia in labour.
3. Endometrioma.

I should be obliged if any members of congress, who may be desirous of speaking in the discussions which will follow the reading of the main papers, will write to me at their earliest opportunity so that the programme may be complete by June 20.

Yours, etc.,

H. M. FISHER,
Hon. Secretary, Section of Obstetrics and Gynæcology.

178 North Terrace,
Adelaide,
May 17, 1937.

THE MODERN TREATMENT OF SQUINT.

SIR: Dr. Bruce Hamilton has replied in your issue of the fifteenth to my article of March 27, but has sidestepped the issue. Instead of apologising to the shades of the two eminent men whom he had (ignorantly, no doubt) so disparaged, he asks me five irrelevant questions. An ingenious and well-known method of controversy.

He is a little disingenuous, too, in implying that my article was sprung on him unexpectedly on the eve of his departure for Europe. I wrote to him in January last, telling him that I felt compelled to break a lance with him on the ground of his misstatements, and hoped that he would not regard it as in any way personal. I have his reply dated February the first. The further delay was caused, no doubt, by pressure of space for more important, and earlier, contributions.

I feel that I should apologize for asking space to reply to Dr. Hamilton's catechism, as my answers can have little interest for anybody, and have no bearing on the issue.

However, here they are.

1. Javal's and Priestley Smith's "opinion" on abnormal retinal correspondence.

Answer: I do not know what their "opinion" was, but I do know that they recognized it, though they called it "false projection", which comes to pretty much the same thing.

2. Why did I quote Travers and not Pugh?

Answer: Because I know Travers and his work, and have confidence in his conclusions, which coincide with my own.

3. Why did I quote Dr. O'Day?

Answer: Because his letter was "pertinent", and I wanted to "expose the inadequacy of his reasoning".

4. How many squint trainers in Sydney hold a diploma of a recognized orthoptic school?

Answer: I do not know. Probably none, as there is no such school in Australia, and they have not been very long in existence in England.

5. Am I prepared to cooperate with other ophthalmic surgeons in Australia in the formation of an orthoptic council?

Answer: Yes.

So far as I am concerned, this argument, if such cross-purposes can be called an argument, is closed.

Yours, etc.,

141, Macquarie Street,
Sydney,
May 17, 1937.

E. TEMPLE SMITH.

THE RELIEF OF PROSTATIC OBSTRUCTION.

SIR: I have read with considerable interest Mr. Henry Mortensen's criticism of my paper, published in the issue of April 17, 1937, referring particularly to my statements that "prostatectomy is completely curative", and that "trans-urethral resection can guarantee only temporary relief". That these views of mine appear to coincide with those of most leading urologists throughout the world would seem apparent from perusal of current literature, and have been arrived at after considerable use of both methods. There is no doubt that trans-urethral resection, whether by "loop" resection, the cautery punch, or by the punch and cautery method, has a very definite and useful place in the treatment of prostatic obstructions. That it can replace prostatectomy by the Harris technique as the operation of election, I cannot concede.

Mr. Mortensen mentions the "inevitable" occurrence of post-operative stricture or "tenting" of the vesical neck, and of persistent fistulæ. While these complications not infrequently did occur following the old methods of prostatectomy, since the inception of the Harris technique there has not been a single case in the practice of either my late brother or of myself. S. Harry Harris always insisted that such complications could only be ascribed to faulty operative technique or lack of attention to detail, and that such also was the cause of "post-operative bacilluria and frequency".

If attention to detail in the carrying out of an aseptic and antiseptic pre- and post-operative technique, as described in my paper, is not meticulously followed, persistent infection is bound to occur.

That the percentage of cure was small in over two hundred patients submitted to prostatectomy at St. Paul's Hospital, London, by four different surgeons, using different methods, is no argument against prostatectomy. The rather heated correspondence that has appeared in recent issues of *The British Medical Journal* supplies more than one reasonable explanation of Mr. Mortensen's figures.

I cannot agree that the "low mortality and short hospitalization" associated with resection should carry any undue weight. Each case should be treated on its merits, consideration being paid, *inter alia*, to the type of prostate and to the general condition of the patient. The mortality from the Harris operation has been consistently around 3% both in public and private hospital practice, and these figures compare favourably with those published in relation to resection. The time spent in hospital has been about five weeks. Preparation (decompression *et cetera*), which is equally important with resection, occupying ten to fourteen days, whilst the post-operative period has been from eighteen to twenty-one days, for the first twelve of which only the patient is confined to bed.

In conclusion, I have found that endoscopic resection has definite limitations, but that when employed with discretion, it has given most satisfactory results. Undoubtedly it must be given due consideration in cases of prostatic obstruction. I would stress again, however, that the Harris operation of suprapubic prostatectomy, in the hands of S. Harry Harris and myself, has proved completely curative and safe. Similar results can be, and are being, obtained by those urologists who are prepared to follow the technique in its minutest detail.

Yours, etc.,
RICHARD G. S. HARRIS.

Craignish,
185 Macquarie Street,
Sydney,
May 17, 1937.

SIR: Dr. Henry Mortensen's letter of May 15 in THE MEDICAL JOURNAL OF AUSTRALIA surely calls for some comment. One would infer from his letter that endoscopic resection is a common method of treatment of the adenomatous prostate in England today and also that the results of this procedure are as good as or better than prostatectomy.

It is not a common method of treatment in England, nor are the results equal to prostatectomy. Probably most urologists have their endoscopic resection instruments, but very few use them except in occasional cases. An exception to this statement is Loughnane, at All Saints' Hospital, London, who is as keen on this method as many Americans. At the same hospital, however, Millin is using this method in fewer and fewer cases. Three or four years ago Millin was using the McCarthy resectoscope as often as Loughnane, and he is using it now less often, I am sure, as he finds he is getting better results by prostatectomy.

At Saint Peter's Hospital, London, where I was on the resident surgical staff for twelve months in 1935-1936, the number of perurethral resections performed was small, about 16%, and of these, many were for carcinoma of the prostate.

I have no knowledge of the amount of perurethral resection work done at the other urological hospital, St. Paul's, but I think Dr. Mortensen himself could supply some information from there.

From my own observations of the prostatectomies and the admittedly small number of perurethral resections performed at Saint Peter's Hospital, I maintain that prostatectomy is completely curative in the majority of cases. The persistent suprapubic fistula will not occur with either the Thomson-Walker or the Harris operations. It certainly will occasionally occur after the Freyer operation, and is one of the main arguments against this quick and easy operation.

Dr. Mortensen asks what percentage of cases still have marked bacilluria and frequency after prostatectomy. The choice of the word bacilluria is surely unfortunate, and I presume Dr. Mortensen means infected urine. The answer is easy. Those who had infected urine and frequency before prostatectomy will have infected urine and frequency after prostatectomy. Dr. Harris rightly states that if infection occurs, elimination of the infection is impossible. At Saint Peter's Hospital all operation cases were told to report back to the out-patient department at intervals after discharge from hospital. Ninety *per centum* of the patients did so, and I can assure Dr. Mortensen that those who did not have infected urines before prostatectomy did not have infected urines afterwards. The trouble, however, was that a big percentage of the cases treated there already were infected before operation.

I might ask now, how many cases have infected urine and frequency after perurethral resection with the McCarthy resectoscope? My answer is that 90% who were not infected before will be infected afterwards. I believe, however, that infection is less likely to occur after the "cold" resection as carried out by Thompson at the Mayo Clinic.

I do not wish to decry the use of endoscopic resection altogether, but the Americans have not yet convinced the rest of the world that it is the ideal method of treating prostatic obstruction despite the figures quoted by Dr. Mortensen. The method certainly had advantages in some cases, and it certainly has a slightly lower operative mortality rate than the late Harry Harris had, but I believe that prostatectomy is still the best method of treatment in the majority of cases. If the results of perurethral resection were as good as those from prostatectomy I should certainly be in accord with Dr. Mortensen in advocating it; but at the present time its disadvantages outweigh its advantages. The endoscopic resection instruments are exceedingly difficult to use and it is only after considerable experience that one can hope to become reasonably proficient. Unless enough prostatic tissue is removed, the operation is completely useless; and then with the McCarthy resectoscope there is always the fear of removing too much, as the coagulation extends a variable distance below the cut surface. It is this coagulated tissue which is the source of the apparently almost inevitable infection. I believe, however, that the Americans are attempting to devise means of limiting this amount of coagulation.

The McCarthy instrument is, however, an excellent one for the treatment of many papillomata of the bladder. Very large ones can be almost completely removed at one sitting.

Yours, etc.,
R. I. CAMPBELL.

142 Main Street,
Lithgow,
May 18, 1937.

"THE OVA OF ASCARIS MEGALOCEPHALA."

SIR: Not being a subscriber to THE MEDICAL JOURNAL OF AUSTRALIA, I was unaware of Professor Wood Jones's letter of April 1 until my attention was drawn to it recently. Will you permit me to reply? He ridicules a "rather striking photomicrograph" of a human ovarian ovum, and structures, which I interpret as spermatozoa.

He asserts that these structures constitute "a typical chromosome picture". Such a statement if made by a first year zoology student would result in his being failed. Whatever else they are, they are certainly not chromosomes, a fact anyone can verify by consulting any text-book upon the subject. A typical chromosome picture of *Ascaris* is presented in the book, Figure 39. The frontispiece he ridicules was inserted for comparative purposes only, and Figure 39 illustrates the specific number for *Ascaris*, namely, four. Four at least of the structures consist of a head-piece, neck-piece, and tail-piece with a typical bulb at the extremity, typical shapes ascribed to spermatozoa.

He asserts that the ovarian ovum is "naturally not a fertilized ovum". Nothing whatsoever concerning fertilization of the human ovum is known with any degree of certainty, and one of the latest writers upon the subject is so concerned with the diverse opinions expressed that he intends doing the whole work again.

A new growth, such as an ovarian dermoid cyst, where nearly all the elements of a fully-formed being are to be found, "teeth without jaws and bone without limbs", *et cetera*, plainly indicate that there can be such a thing as a fertilized ovum in the ovary, and an ectopic abdominal pregnancy also confirms this fact.

If he had read my work carefully enough he would have found what was thought to be the male cell (sperm) is a copulated or conjugated male and female cell.

Vines Collier naïvely states that the acrosome is not acquired by the male sperm until it enters the uterus of the female. If the Professor had kept his reading up to date he would have known that *Ascaris*, the prototype of all ova, has been intensively studied for the past fifty years in almost every university in the world, and that the acrosome, perforatorium, refringent body, Golgi apparatus, call it what you will, proves to be the nucleus of a female cell with which the male conjugates, and this cell is not an ovum. This female cell contributes an equal

amount of nuclear substance and chromatin to the male cell, a much more rational conclusion than that the mother contributes a billion times the mass of cell that the father contributes, the theory at present held. There are a great number of these conjugated cells in one ovum. Such a dogmatic assertion as the Professor's merely arouses one's amusement.

He asserts that the ovum is that of a cat. Desirous of obtaining a stained section of a human ovary, I applied to the Professor's department, the School of Human Anatomy, not the Zoological Department, for one. I was given and received a section of a human ovary, and it was placed under the microscope to make sure before I accepted it.

The Professor was not present and knows nothing about the matter. What is disclosed, however, is the fact that cat's ovaries are handed to students in lieu of human and they are not aware of the deception, and this in a department of human anatomy. The human ovarian ovum in a Graafian follicle is somewhat of a rarity, but is not uncommon, and can be found illustrated in text-books.

If a student had found such in a slide which he was given as human material and had reported his find, he might have felt aggrieved to be told by the Professor that he had made a ridiculous error. Your readers can judge who has been guilty of ridiculous behaviour. As a matter of fact it does not matter one straw whether the ova are those of flesh, fowl or red herring. The principle involved is the same for all, and if any reader of the book feels he should, he can cross out "human" and substitute "cat".

What clearly emerges is the fact that the Professor has attempted to ridicule, by an ill-natured letter, a thesis of which he himself would be incapable of performing. I have solved the problem in *Ascaris* which every university in the world has failed to do, and unless the facts contained in this work are understood, malignancy will never be solved. Meves confirms my findings partially. The Professor dissociates himself from my work. I have already done so and he is a little late.

Yours, etc.,

CHARLES E. ALLEN, D.D.Sc.

Undated.

A SYMPOSIUM ON CANCER.

SIR: On reading Dr. Molesworth's letter in the journal of May 15, I felt that he had been somewhat severe in his remarks as to the attitude of general surgeons regarding the use of radium or X ray therapy in the treatment of malignant disease.

He refers to "the intransigence of those surgeons whose vision and experience is so narrow that it prevents them from realising that radium tubes and needles should be tools as ready to the surgeon's hands as a scalpel". I am sure that many surgeons in this respect have found themselves similarly situated to myself, that is, they tried to understand and perfect their knowledge and technique in the use of radium, but found the voluminous literature beyond their powers of reading or comprehension, the "experts" available so inconsistent and vague in their advice, the published techniques and results of serious workers at such variance with those of the enthusiasts, and the whole matter in such a state of indecision and flux that they became discouraged in their efforts to follow it all in the scant time at their disposal.

As a result, it seemed wiser to await some reasoned opinion and advice from the great world centres before we could honestly advise our patients on any but the straightforward conditions.

I feel that the question of dosage and general radium technique is best left in the hands of those who are in a position to devote their main interest to it—let them advise the general practitioners as well as the general surgeons which types of lesion are most suitable and let them carry out the treatment in conjunction with the surgeons.

The same remarks apply in the main to X ray therapy, and I am sure Dr. Molesworth does not expect us to be as expert in the carrying out of this method of treatment as he is. No surgeon is enamoured of his results in the treatment of malignant disease and we are all looking for help and guidance in the matter of advising the unfortunate sufferers who consult us. Hostile criticism is of no value, but a frank statement as to results will help a lot. None of us care to subject our patients to experimentation without telling them so or being able to give them a reasonably hopeful outlook.

We have so had it thrust upon us that radium and X ray therapy is a matter for the physicists and experts that we feel diffident in obtruding our practical experiences into the academic "dreamland" of these gentlemen, but it appears the time has come when we must do so and I trust some abler pen than mine will follow up this matter.

Dr. Molesworth refers to carcinoma of the breast. First, I will quote two recent expressions of opinion from recognized authorities:

1. In *The British Medical Journal*, November 14, 1936, page 987, there is an abstract of a report from the Medical Research Council in which it is stated that "at the Marie Curie Hospital radical surgical removal is carried out wherever practicable in breast and uterus"; whether irradiation is also carried out I am not sure.

2. Geoffrey Keynes states in *The Lancet*, February 29, 1936, page 480, in discussing breast carcinoma, that he "recognized more and more the limitation of radium which would not give greatly better results than good surgery. He therefore used surgery before radium more often than in the past". In view of his previously expressed enthusiasm for radium, this is a definite modification of his previous views.

In a very interesting analysis of published statistics from British, European and American literature, R. G. Hutchison, of Glasgow, in *Surgery, Gynecology and Obstetrics*, April, 1936, gives the following figures:

Percentage Cure Five Years or More.

	Early.	Late.	Unclassified.	Very Advanced.
Surgery alone ...	71·3	35·0	28·1	9·1
Surgery and X rays	74·7	41·0	40·9	9·1
Radium alone ...	47·1	16·6	—	19·5
X rays alone	73·3	46·5	42·3	18·6
Radium and surgery (2 authors only)	—	—	30·0	—

He also gives figures for "three years or more", but I think these only prove that a minimum period of five years should be the criterion of cure for carcinoma of the breast, as there is a big drop from the three years' figures as compared with the five year.

This analysis rather points to X rays alone as the best chance for the late cases, but surgery *plus* X rays gives the best results for the early cases, that is, where glands are not palpable. These figures are rather in support of the opinions quoted above.

The bugbear in all cases is the question of metastasis and will, it seems, continue to be so until some further advance in our knowledge of the disease and its treatment is made.

This sort of information is what the men in practice want, and I would suggest to the Cancer Research Committee that if it were to epitomize current opinion and literature for us in their journal it would be helping very materially in the problem.

From the surgeon's point of view the usual pre-operative irradiation makes the actual operation more difficult, and for long I have thought that a lethal dose of X rays should be given over a period of four days or so prior to operation, as any carcinomatous cells liberated at the time of the operation would probably die.

Dr. Molesworth has done this for me in a few cases in private practice and the results would seem to justify further experience of the method, although in routine hospital practice it is difficult to arrange.

Now for the question of epithelioma of the lip. Dr. E. S. Meyers raised this subject in the journal of March

13, 1937, and quoted Dr. Archie Aspinall's letter which was published in June, 1934, *re* "wait and see" methods.

Dr. John MacMahon, as Syme Scholar, presented a first-class *résumé* to the Royal Australasian College of Surgeons at their meeting in Auckland in January last and again at the recent Canberra Conference. I am sorry Dr. Molesworth sees fit to criticize this report, as it is a very important piece of work, even though, as Dr. Molesworth states, radium was "in the hands of a committee almost entirely inexperienced in the use of this remedy". Of course his simile *re* the professional pugilist and the schoolboy is open to the retort: "Why send a boy on a man's errand?"

To me all these observers have overlooked the vital point in the prognosis of epithelioma of the lip, namely, whether the lesion is confined wholly to the cutaneous surface or whether it has involved the mucous surface.

Consider the lymphatic arrangement of the two areas—cutaneous poor, mucous and submucous extraordinarily rich. Epithelioma of the cutaneous portion behaves to local excision, radium or X rays just as it does in any other part of the body, that is, is most favourable to any forms of local treatment alone. But if it involves the mucous surface the whole outlook is changed because of the free lymphatic anastomosis and the liability to gland metastasis. It is my invariable practice to recommend thorough excision of the glands of the neck on both sides once the mucous surface of the lip is involved.

For Dr. Molesworth's edification I would state positively that the inability to palpate glands in either neck or axilla is no criterion that they are not involved and that once glands are palpable the prognosis becomes grave. I could quote many cases in support of this contention.

Some three weeks ago I removed the glands of the neck in a case of early epithelioma of the mucous surface of the lip on the left of the mid-line, and on pathological examination the only gland found involved was the digastric gland on the opposite side. This week I removed a breast which had been irradiated two months previously and found apparently active carcinomatous cells in the breast and two metastatic glands that were not palpable clinically.

Dr. Molesworth refers to "operation" as being a deterrent in people seeking advice in the early stages. A wedge excision of the lip can be done under a local anæsthetic and is healed and stitches are out in five days. Contrast this with the insertion of radium needles—general anæsthetic as a rule—needles in for some four to seven days with gradually increasing reaction—a hugely swollen lip for another seven to ten days and healing not occurring for several weeks. I know which method I would prefer if I had an epithelioma of the lip either on the cutaneous or the mucous surface!

I recall one local excision I performed for a cutaneous epithelioma of the lip dating back eighteen years now and the patient has no apparent scar and no recurrence.

In these days the "fear" of an operation can be removed, and it is more a matter of educating the general public *re* early diagnosis of carcinoma than that of educating their medical advisors as to the "fear" aspect.

Irradiation therapy, whether by radium or X rays, has come to stay, and has a very definite place in our armamentarium, but if its champions would adopt a more tolerant attitude to the less enlightened members of the profession we would work together much more harmoniously for the ultimate good of our patients.

In conclusion, may I once again make an appeal for the disuse of the term "cancer" and replace it by "malignant growth"—the lay public dread the implication of cancer, and this is where their fear of operation comes in, as they regard one so afflicted as being hopeless, whereas with a "malignant growth" they retain hope and lose their fear.

Yours, etc.,

HUGH R. G. POATE.

225 Macquarie Street,
Sydney,
May 22, 1937.

PROTEIN SHOCK IN GONORRHŒAL OPHTHALMIA.

SIR: I greatly regret that Dr. Waddy (THE MEDICAL JOURNAL OF AUSTRALIA for May 15, page 769) should resent the gentle sarcasm in the last (and only the last) sentence of my letter. It was, of course, merely a response to the didactic emphasis with which he had urged the "virtue and fact" of milk injections and pressed for the routine infliction of protein shock on infants with *ophthalmia neonatorum*.

Unfortunately Dr. Waddy's letter makes no attempt to justify his contention except to condemn it with the very faint praise contained in the quotation from the Giza report. Unless a definite and marked improvement in the visual results is obtained by the use of protein shock, can it be considered as anything other than meddlesome medicine? I must therefore ask Dr. Waddy, not for his entirely irrelevant statistics of the incidence of gonorrhœal ophthalmia in Egypt or the equally irrelevant numbers that he himself has seen, but for some strictly comparable figures of the visual results in the new-born, with and without protein shock therapy. How, for instance, in Sydney, do his results compare with those obtained without milk injections?

It is very remarkable that at a recent discussion on the subject in England the milk injection treatment received scant support.

With the happy if humble experience of twelve consecutive cases with unharmed corneæ, treated only by boracic lavage, I must ask Dr. Waddy for some cogent scientific reason for adopting the "virtue and fact" of what appears to be at once an irrational, unnecessary, possibly harmful, and more or less discredited procedure.

Without some comparison of results and benefits, of advantages and disadvantages, without something more than a mere personal bias, Dr. Waddy would not surely be "hammering" the treatment into medical students. May one ask him for the logical basis of his so strongly expressed views?

Yours, etc.,

E. O. MARKS.

Brisbane,
May 20, 1937.

Proceedings of the Australian Medical Boards.

NEW SOUTH WALES.

THE undermentioned have been registered, pursuant to the provisions of the *Medical Act*, 1912 and 1915, New South Wales, as duly qualified medical practitioners:

Bourke, Herbert Merwin, M.B., B.S., 1922 (Univ. Adelaide), Elizabeth Bay.

Finkle, Edmund Wesley, L.R.C.P., 1937 (Edin.); L.R.C.S., 1937 (Edin.); L.R.F.P.S., 1937 (Glasgow), Wahroonga.

Fison, David Charles, M.B., B.S., 1937 (Univ. Sydney), Brisbane.

Kahla, Sydney Edgar Louis, M.R.C.S., 1936 (England); L.R.C.P., 1936 (London), Dulwich Hill.

Langmore, Leonard, M.B., B.S., 1935 (Univ. Melbourne), Sydney.

Selby, Doris Adeline, M.B., B.S., 1937 (Univ. Sydney), Melbourne.

Best, John Cleveland, M.B., B.S., 1925 (Univ. Melbourne), Newtown.

Govan, Edna Lyall, M.B., B.S., 1921 (Univ. Melbourne), Summer Hill.

Statham, Clive Laurence, M.B., 1936 (Univ. Sydney), England.

Books Received.

CANCER AND DIET, WITH FACTS AND OBSERVATIONS ON RELATED SUBJECTS, by F. L. Hoffman, LL.D.; 1937. Baltimore: The Williams and Wilkins Company; London: Baillière, Tindall and Cox. Medium 8vo, pp. 788, with illustrations. Price: 22s. 6d. net.

HANDBOOK FOR MIDWIVES AND MATERNITY NURSES, by M. Mayes, S.R.N., S.C.M.; 1937. London: Baillière, Tindall and Cox. Demy 8vo, pp. 478, with illustrations. Price: 8s. 6d. net.

HANDBOOK OF HYGIENE FOR STUDENTS AND PRACTITIONERS OF MEDICINE, by J. W. Bigger, M.D., Sc.D., F.R.C.P.I., D.P.H., M.R.I.A.; 1937. London: Baillière, Tindall and Cox. Demy 8vo, pp. 418, with illustrations. Price: 10s. 6d. net.

THE FUNDAMENTALS OF ELECTROCARDIOGRAPHIC INTERPRETATIONS, by J. B. Carter, M.D.; 1937. London: Baillière, Tindall and Cox. Demy 8vo, pp. 341, with illustrations. Price: 20s. net.

MODERN DISCOVERIES IN MEDICAL PSYCHOLOGY, by C. Allen, M.D., M.R.C.P., D.P.M.; 1937. London and Melbourne: Macmillan and Company, Limited. Demy 8vo, pp. 290. Price: 8s. 6d. net.

WHAT IS OSTEOPATHY, by C. Hill, M.A., M.D., D.P.H., and H. A. Clegg, M.A., M.B., M.R.C.P.; 1937. London: J. M. Dent and Sons, Limited. Demy 9mo, pp. 237, with illustrations. Price: 7s. 6d. net.

Diary for the Month.

JUNE 8.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
JUNE 11.—Queensland Branch, B.M.A.: Council.
JUNE 15.—New South Wales Branch, B.M.A.: Ethics Committee.
JUNE 16.—Western Australian Branch, B.M.A.: Branch.
JUNE 17.—New South Wales Branch, B.M.A.: Clinical meeting.
JUNE 22.—New South Wales Branch, B.M.A.: Medical Politics Committee.
JUNE 23.—Victorian Branch, B.M.A.: Council.
JUNE 24.—New South Wales Branch, B.M.A.: Branch.
JUNE 24.—South Australian Branch, B.M.A.: Branch.
JUNE 25.—Queensland Branch, B.M.A.: Council.
JULY 1.—South Australian Branch, B.M.A.: Council.
JULY 2.—Queensland Branch, B.M.A.: Branch.
JULY 5.—New South Wales Branch, B.M.A.: Organization and Science Committee.
JULY 6.—New South Wales Branch, B.M.A.: Council (Quarterly).

Medical Appointments.

Dr. A. H. Joyce has been appointed, pursuant to the provisions of the *Workers' Compensation Acts*, 1928, of Victoria, to be a Medical Referee at Melbourne.

* * *

Dr. W. B. Ryan has been appointed Acting Medical Superintendent of the Mental Hospital, Mont Park, Victoria, pursuant to the provisions of the *Lunacy Acts*, 1928, of Victoria.

Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, *locum tenentes* sought, etc., see "Advertiser", pages xxii to xxiv.

FREMANTLE HOSPITAL, FREMANTLE, WESTERN AUSTRALIA: Medical Superintendent.
HOSPITAL FOR TROPICAL DISEASES, LONDON, ENGLAND: Pathologist, Honorary Assistant Physician.
MARYBOROUGH HOSPITALS BOARD, MARYBOROUGH, QUEENSLAND: Senior Resident Medical Officer.
MAYER MISERICORDIÆ PUBLIC HOSPITALS, BRISBANE, QUEENSLAND: Honorary Officers.
THE BRISBANE AND SOUTH COAST HOSPITALS BOARD, QUEENSLAND: Honorary Officers.
THE PUBLIC SERVICE BOARD, SYDNEY, NEW SOUTH WALES: Assistant Medical Officer of Health.
YALLOURN MEDICAL AND HOSPITAL SOCIETY, YALLOURN, VICTORIA: Medical Officer.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment referred to in the following table without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCHES.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 135, Macquarie Street, Sydney.	Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. North Sydney Friendly Societies' Dispensary Limited. People's Prudential Assurance Company Limited. Phœnix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association, Proprietary, Limited. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
QUEENSLAND: Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17.	Brisbane Associate Friendly Societies' Medical Institute. Proserpine District Hospital. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY Hospital are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.
SOUTH AUSTRALIAN: Secretary, 178, North Terrace, Adelaide.	All Lodge appointments in South Australia. All contract Practice Appointments in South Australia.
WESTERN AUSTRALIAN: Honorary Secretary, 205, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.

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